Tacit Knowledge in Learning to Teach: What are the Possibilities for Student Teachers?

Thesis

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Tacit knowledge and learning to teach: what are the possibilities for student teachers?

Nicola Warren-Lee MEd, PGCE, BSc (Hons)

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Abstract

This study focuses on a particular type of knowledge which is referred to throughout as *tacit knowledge* and has been identified as a personal form of knowledge, which plays a key role in the practice and professional development of teachers. In the context of Initial Teacher Education tacit knowledge is important to consider as *what* student teachers are learning and *how* they are learning it is of current, pressing concern to initial teacher education in England.

The role of and access to tacit knowledge in student teacher learning were investigated using a case study approach employing stimulated recall interviews wherein mentors were asked to reflect upon their teaching and explain their teaching actions. Stimulated recall interviews involved student teachers taking on the role of interviewer. Thematic analysis of data revealed that student teachers probed key teaching episodes and encouraged mentors to reveal complex decision making which may otherwise have remained undisclosed.

Main findings show that both student teachers and experienced teachers see tacit knowledge as useful in the learning to teach process. Interviews reveal that observable teaching actions had complex underlying reasoning and this was elicited via objective-led dialogue between student teacher and mentor, post-teaching. Student teachers were able to independently select teaching events to examine further, and were able to understand their mentor's actions and judgements more deeply as a result of stimulated recall interviewing.

The implications arising out of this study include a need for change to observation and debriefing practices in school, with student teachers and mentors becoming more aware of the value and purpose of tacit knowledge. The benefits of student teachers being instrumental in initiating and asking questions which can elicit experienced teachers' tacit knowledge are clear; and findings show the potential for student teachers to become more pivotal in their own learning. Where stimulated recall interviews were used mentors were encouraged to reveal embedded reasoning underpinning their classroom practice.

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Acknowledgements

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Tacit knowledge in learning to teach: what are the possibilities for student teachers?

> *In daily classroom life, teachers choose how to act and decide what to do, that is, they exercise judgements. These judgements may be intuitive or explicit, often have important consequences and are not only driven by rational thinking but to a large degree by human experiences and emotions* (Wilson and Demetriou, 2007:214).

Chapter 1 Introduction

1.1. Background and context.

Having worked as a secondary school teacher, a school-based student teacher (ST) mentor and a curriculum tutor on a Post Graduate Certificate in Education (PGCE) course, I have over 15 years of experience in working with pupils in classrooms and supporting other adults interested in qualifying to be teachers. I always enjoyed talking about teaching and learning, evaluating lessons and thinking about what could have been done differently. In my work with STs this was a key part of my role as mentor and, latterly, as a curriculum tutor on a university-based PGCE programme.

My curriculum tutor role is concerned with supporting STs in achieving the government prescribed Teachers' Standards (Dept. for Education, 2011). These Standards specify the

minimum skills and knowledge required by all teachers. My role involves supporting STs to develop new knowledge and understanding about teaching and learning in geography and to be able to put these ideas into practice in classrooms as part of their school experience.

Ways of improving the ability of STs to develop their understanding and skills whilst on the PGCE is of professional concern to me and to others working in the field, most notably when an individual may be struggling to make progress. Having seen many STs through their PGCE course it is of interest to me how and why some progress faster than others. I have been particularly interested in what STs are learning from their school based mentors and it is within this area I have chosen to undertake my research.

As a university-based (PGCE) curriculum tutor my current professional setting provides a good opportunity to undertake the relevant research. I work with, on average, 22 beginning geography teachers and between 15-20 school-based mentors, who are also geography teachers. I am hoping to gain a significant amount of insight into how mentors and STs are working together and what is possible in terms of understanding observed teaching practice on a deeper level. My research will inform my own practice and others working in initial teacher education (ITE) in supporting STs in their pursuit of learning from experienced teachers.

I have used the terms student teacher (abbreviated to ST) and pupils (to refer to school age children) where possible throughout my research to separate the categories clearly.

1.2. The qualification of teachers in England

Full time education in England is compulsory for children aged between 5 and 16. Between the ages of 16-18 pupils must remain either in full-time education, start an apprenticeship or spend 20 hours or more a week working or volunteering, while in part-time education or training. State funded, 11-18 schools can be either comprehensive (open to all) or selective (for example, chosen on the basis of an ability test). Funding for state schools can come through the local education authority or, increasingly, those which have opted to be self-governing and to receive funding directly from the DfE; these schools are known as academies. There is also a private, fee paying education system running alongside the state maintained sector in England. For the purposes of my research the focus will remain upon the state maintained education sector in England as this covers the majority of the population and is where my research participants are taken from.

Most children in England will attend a secondary school starting at the age of 11 and it is at this stage where subjects are studied separately and therefore teachers are trained in their own specialist area. There are also middle schools catering for children aged 8 up to 18; however, these are less common than secondary schools (11-18 years). My research focuses upon the teacher education system in England which prepares individuals to teach their specialist subject in state maintained secondary schools.

There are different routes into becoming a teacher in England. There are school-led routes and university-led routes (undergraduate and post graduate), both providing ITE and qualified teacher status (QTS). In 1992 government legislation gave schools 'joint responsibility for the planning and management of [teaching] courses and the selection, training and assessment of students' (DFE, 1992; para 14). School involvement in ITE has

increased further since 2012 with the introduction of School Direct (SD) where the responsibility for training STs lies with the school; however, the university-led PGCE still maintains a prominent presence in the qualification of teachers. Sixty eight per cent of graduates gaining QTS in 2014 did so via a Higher Education Institution (HEI) led PGCE course (DfE, 2015). My research focuses on a university-led PGCE programme. The programme is a full-time teacher education course for graduates, involving a close partnership between the university department and local comprehensive schools.

This section has highlighted that there are different ways of qualifying to become a teacher in England and that this is still an evolving process.

1.3. The importance of mentors within Initial Teacher Education (ITE)

Whilst learning to teach on a PGCE course STs will have a school-based subject specific mentor, who is usually an experienced teacher within the subject area. The mentor will be designated to oversee the support and development of a ST, working alongside them to support lesson planning, lesson delivery, pupil assessment and other aspects of teacher development. In this research the term 'mentor' refers to a qualified teacher who has a responsibility for the training and development of STs; and also any other qualified teacher who works with STs in collaborative planning, teaching and reflection.

Mentors become pivotal colleagues, working with STs on a regular basis. They are timetabled to have weekly support meetings and often work together with STs in the classroom supporting their practice and reflection. There is strong agreement over the importance and influence of mentoring practices within the context of learning to teach (Feiman-Nemser, 1998; Jones and Straker, 2006; Parker-Katz *et al.*, 2008; Crasbourn *et al.*,

2011; Hudson, 2012) with mentors regarded as 'highly valuable' in helping STs to understand the relationship between teaching and learning (Parker-Katz *et al.*, 2008: 1260) and STs themselves identifying mentoring relationships to be the 'key aspect' of school based practice (Hobson, 2002: 5).

As the mentor – ST relationship is pivotal in learning to teach it is notable that there are studies which have revealed areas of mentoring in need of improvement. Jones and Straker (2006) investigated mentors' professional knowledge base when working with STs, concluding that more resources were needed for mentors to develop evaluation and reflection on their own mentoring practice, which could potentially build a greater understanding of underpinning pedagogical principles. This is particularly pertinent in light of the rise in school-led training which inherently increases the responsibility for the training onto school staff who may have had little or no guidance in how to deliver and support teacher education (Wang *et al.,* 2008; Hobson *et al.,* 2009). Becoming an effective mentor requires professional development, teaching experience is not enough on its own.

Research into the importance and influence of mentoring is persuasive and suggests that STs who receive quality mentoring are more likely to stay in the profession (Smith and Ingersoll, 2004) and are more likely to have a greater sense of wellbeing and commitment to teaching (Ingersoll and Strong, 2011). The quality of mentoring also has implications for the STs ongoing professional development (Richter *et al.,* 2013) and therefore a mentor's influence is not confined to the initial training year. Mentors can help STs understand teaching practice as opposed to imitating it (Hagger and McIntyre, 2006) and can therefore help to broaden their understanding of wider educational issues outside of the immediacy of a classroom or school setting.

The nature of what STs learn whilst training to teach is variable and, in some instances, where mentoring is superficial and practically driven, can lead to a 'mediocre pedagogy' (Stones, 1992:141). Mentoring where explanations are not expected and learning to teach is reduced to a 'show and tell' approach (Buitink, 2009: 118) can seriously limit the underpinning understanding a ST develops regarding their own teaching practice. The 'why' is overshadowed by the 'how' in a need to be time-driven and efficient, with longer term goals of self-reflection, criticality and autonomy for the ST becoming more peripheral. The mentoring context in which an ST learns to teach has a significant impact upon not only their practical skills of teaching within a particular context but also their deeper understanding of wider issues, such as how to teach their subject and how pupils learn.

A mentor as a colleague to practice and discuss teaching with, to move STs forward and away from a 'do as I do' mimicry approach (Loughran, 2006), can encourage a deeper understanding of teaching practice. As teaching cannot be simply articulated, it is participation in the classroom and the critical discussion of events which can be said to allow practical theorising (McIntyre: 1995), an important part of developing professional knowledge. Such possibilities for ST professional learning are not consistently delivered within a mentoring context however, and a lack of shared understanding of what constitutes effective mentoring can result in idiosyncratic practice. Where mentors do not see their practical knowledge to be as important as research knowledge, and they hold a strong belief that each teacher should develop his/her own style, a collaborative relationship becomes less likely (Feiman-Nemser, 1998). Mentors have been found to misunderstand what is required of the role and to prioritise facilitating practice in front of pupils over developing a context within which a ST can learn (Bullough, 2005).

Mentoring is a 'contested notion' (Kemmis *et al.,* 2014: 156) and can mean different things to different people (Britton *et al.,* 2003). Mentors' own understanding and positioning of their practices seems to be highly influential over the type of mentoring a ST receives (Vanassche and Kelchtermans, 2014). There are also conflictual elements within the role of mentor as their responsibilities can include assessing the formal competencies of STs against the teachers' standards whilst supporting and guiding their professional practices and identity (Kemmis *et al.,* 2014). Therefore, there is the potential for a ST to be in the position of asking for help and openly discussing problems with the very person who will be assessing his/her competence and ability to qualify.

The ways in which mentors are working with STs and, more specifically, how mentors' teaching knowledge is being accessed and used by STs is of current concern, and is the focus of my research. This research explores a form of post-lesson discussion wherein STs take the lead role in questioning; seeking to determine if a mentor's implicit teaching knowledge can be made explicit and available for use.

1.4. Student teacher knowledge

There has been long standing debate about what STs should learn whilst on an ITE course. University-led programmes are known for delivering ITE courses which link theory and practice together whilst school centred training offers practical induction into the profession. With school centred training, theory and evidence based research can play a smaller part in the learning programme in what has been termed a 'turn to the practical' (Beauchamp *et al.,* 2015: 156) and this turn has been said to 'de-intellectualise the profession' (Hobson *et al.* 2009: 208). However, this view is not agreed upon as the DfE's

(2016) 'get into teaching' website states that 'academic rigour on School Direct is the same as on university-led courses'. Although with the 2011 Teaching Standards in England (DfE, 2011) being referred to as 'predominantly skills-based, indicating a decisive shift away from the idea of teaching as a research-based profession and intellectual activity towards teaching as a craft-based occupation' (Beauchamp *et al.*, 2015: 158) the place and purpose of knowledge in ITE is unclear. So, the type of knowledge prioritised for STs can vary according to the chosen route into the teaching profession resulting in differing levels of practical knowledge, evidence based theory and subject specific pedagogy being integrated.

Whether STs are, or should be, learning practical skills or theoretical knowledge (and to what extent) has been the focus of various research studies and 'reconciling the perceived gap in theory and practice is a recognised problem in teacher education' (Jones *et al.,* 2014:19), with the theory–practice divide said to have 'remained the central problem of pre-service and in-service teacher education during the whole of the twentieth century (Lanier & Little, 1986: 530). A 'strong model of professionalism' (Taber, 2007:6) where educational research and theory are used to critically inform STs' practice is a desired model agreed upon by many, for example: Burn, 2007; Edwards and Mutton, 2007; Korthagen, 2010; McNicholl, 2013; Jones *et al.* 2014. Korthagen (2010:420) discusses the importance of ITE courses combining theory and practice warning that, 'in many programmes, the traditional approach of 'theory first, practice later' has been replaced by the adage 'practice first, theory later', where programme structures have been created in which [STs] 'sometimes receive very little theoretical background, and teacher education becomes more of a process of guided induction into the tricks of the

trade'. There is disagreement over what type of knowledge STs should learn and where they are best placed to learn it.

There are three types of teacher knowledge identified by Winch *et al.* (2013). Other types of teaching knowledge are identified elsewhere. However, using Winch *et al.'s* definition helps to delineate how the knowledge under focus in my research (tacit knowledge) (TK), is unique and different to other types. The three types identified by Winch *et al. (ibid.)* are: situated understanding, technical knowledge and critical reflection. These types of knowledge, and where TK may sit within them, are discussed in more depth in Chapter Two. Situated understanding (which can include TK) is a potentially difficult area of teaching knowledge to access due to its implicit nature and, unlike espoused (formal) knowledge, it is owned in very personal, particular ways which can make sharing and understanding it more intangible. As mentors gather experience they build up situated understanding (and therefore TK). This understanding can become a source of learning for STs. If this source of learning can be identified and accessed it could enhance ITE courses and provide further support for ST development. This latter point is a driving force throughout my research as I intend to find out if the TK of experienced teachers can be identified and accessed by STs.

Different views on the types of knowledge STs should learn whilst qualifying to teach have implications for the terms used for this period of learning. Two terms are often used for the preparation of new school teachers: ITE and initial teacher training (ITT). The difference between the two is less official and more philosophical, with HEIs tending to utilise the term ITE, prioritising the educative process involved. ITT can be seen to be reflective of the notion that teaching can be learned through an apprenticeship style, e.g.

as a craftsman can be trained. Throughout this study I shall be using the term ITE which illustrates my affiliation to the educative process of learning to teach

1.5. The research questions

I have outlined my role as a teacher educator, the importance of mentoring in the ITE process and the ongoing debate over what constitutes essential teaching knowledge. In light of this information my key research questions to investigate are:

Key research questions

1. **What is the role of tacit knowledge in student teacher learning?**
2. **What are the ways in which student teachers can access tacit knowledge from their mentor or more experienced colleagues?**
3. **What factors encourage student teachers to develop their understanding of tacit knowledge for teaching use?**

1.6. Research rationale and relevance

This section identifies why my research is an important and relevant piece of work.

Being involved in the professional development of STs for 15 years has provided the experience and impetus for me to undertake this research. The changing landscape of ITE is of concern to me and I feel there is a strong need for an evidence-based approach to designing programmes of teacher education. This is in contrast to a politically popular or anecdotal approach. Therefore, research which investigates best practice for learning to

teach, in authentic classrooms with teachers, is logical and informative and can enable ITE programmes to evolve and respond to new ideas and changes in society.

I see my research as having clear and direct relevance to others involved in ITE. My research intends to add to the evidence base for designing ITE courses and informing mentoring programmes. Published mentoring standards (DfE, 2016) have raised the importance of having quality in-school support for the development of STs and I believe that the type of ST mentoring we have in schools is a choice. This choice has implications for the future of the profession (Kemmis *et al.,* 2014); including whether or not teachers learn to be passive or active within the context of their own professional development. My research adds to a body of knowledge on ST learning and effective mentoring practices in ITE.

1.7. Thesis overview

After this chapter, a literature review in Chapter Two will define the term *tacit knowledge* in more detail. TK will then be discussed in terms of its relevance in teaching and also in the learning to teach process. Chapter Two also deals further with the importance of mentoring in the learning to teach process and investigates existing research on the ways in which mentoring practices can influence ST development. Research on why accessing 'the minds and not only the observable behaviours' (Ethel and McMenimann, 2000:87) of mentors is a worthwhile pursuit is detailed, and the possibilities for accessing TK are explored.

Chapter Three is a discussion of the methodology followed throughout this research. Reasoning for why a qualitative case study approach has been followed is outlined and

this includes a look at the strengths and weaknesses of case study. The thematic analysis of data is discussed including how this analysis technique was followed. The basis on which my research can claim to have 'found out' new information is presented here, including issues of validity and 'confirmability' (Lincoln and Guba, 1985: 332). The limitations of this study are also included in Chapter Three to allow a transparent picture of what was done and at what stage; and on what evidence base the conclusions and resultant suggestions for policy and practice were made.

Chapter Four presents and analyses the findings from the data collection. The interviews are presented first as these make up the main body of data and cover the four case studies which have been carried out. Supporting data are also presented in this chapter, including the results of a focus group discussion carried out early on in the study; and a questionnaire which was sent to a wider population of STs and mentors to get a greater response on issues which were being followed up in more detail through the case studies. Data are presented through extended quotation, graphs and tables. Ideas from professional and research literature, previously discussed in Chapter Two, will be returned to here and links are made between existing ideas and the findings from my research.

Chapter Five is a discussion of the findings. Themes arising from the analysis of all combined data, and the key research questions, lead the discussion.

Chapter Six reviews and concludes the research. The implications of the research are outlined: for STs, for mentors and for ITE. How my research contributes original and useful information to the field of ITE is made clear and limitations are acknowledged. Suggestions for policy and practice arising out of my research findings are presented and

ways in which these findings will be disseminated are discussed. Suggestions for further research, which could take key learning points forward, are included.

Chapter 2 Literature Review

This review of literature focuses on defining TK and on placing this concept within a teaching and teacher education landscape. The importance of the mentor-ST relationship will be clarified and the potential for accessing TK will be discussed.

2.1. Tacit knowledge

'We know more than we can tell' (Polanyi, 1966: 4).

Polanyi was one of the first writers who introduced the idea of TK in his book *Personal Knowledge*, first published in 1958. Since this time there have been authors who have utilised and developed the meaning of TK (Fenstermacher, 1994; Eraut, 2000, 2004 and 2007; Toom, 2012). TK is personally owned knowledge; held within the individual in a unique way. It is this 'unique' characteristic which delineates TK as separate from other forms of knowledge. Other forms of knowledge can often be sourced in books, journals, from the internet; discussed and agreed upon by an academic community. TK is most often utilised when the owner is acting within a context as part of the process and functioning TK is drawn upon to inform the action. At the time of the action itself TK can be seen as subconscious knowledge.

Eraut (2000: 114) poses two forms of knowledge:

1. **Codified or propositional knowledge**. This can be spoken, written and agreed upon by an academic or experienced community. This knowledge is subject to quality control and

is ‘given status by inclusion in education programmes, examinations and courses’. Also known as formal knowledge.

2. **Personal knowledge**. This is defined as ‘the cognitive resource which a person brings to a situation that enables them think and perform’. Also known as informal knowledge.

Codified knowledge is explicit and open for all to access should they wish. Personal knowledge can be either explicit or tacit. These two forms of knowledge appear to be largely agreed upon (Argyris and Schön, 1974; Fenstermacher, 1994; Eraut, 2000; Toom, 2012) and it is on the personal, tacit form of knowledge that my research focuses.

In trying to define TK further it is useful to clarify how it is referred to in different ways. Polanyi (1962:71) defines TK in terms of ‘knowing as an art, as a skill of the knower.’ Adjectives used to describe TK by Rolf (2002: 5) include: vague but relevant; regionally valid; context bound; personal, anchored to emotions; humanistic; mediated by examples and unclear. Eraut (2000:116) states that ‘tacit knowledge has acquired a wide range of meanings’ and Toom (2012:622) concurs with this lack of agreement by saying ‘the phenomenon of tacit knowledge is implicit, diffuse, and elusive in nature and [...] is multifaceted’. Although there is not an agreement upon a definition or delineation of what TK is, in much of the literature TK is viewed as an important source of knowledge which drives individuals to behave in unique ways.

In addition to different views over a definition of what TK is, there is the question of whether TK can be accessed and spoken in propositional sentences; and whether it can be transformed from the personal domain into a conscious, explicit understanding. Molander (1992:17) doubts this possibility stating that ‘silent knowledge cannot necessarily be translated back into propositional discourse’ and Van Manen (1999:45)

considers TK to be 'embodied in skills that are located inside practices, ways of doing things' and near impossible to explicate. However, other (more recent) works have shown individuals' TK to be accessible and a source of knowledge and learning useful to others, especially those concerned with professional learning (Ethel and McMeniman, 2000; Toom 2006; Eraut, 2007). Eraut's (*ibid.*) study recognised mediating artefacts as a way of articulating TK and this method is also recognised by both and Polanyi (1962) and Toom (2012) all in agreement that if we are given suitable ways of articulating ourselves then explicating TK is possible. Sternberg and Horvath (1999) also suggest that TK can be inferred from case based instruction and observable action. There is some consensus that TK can be made available beyond the individual. This consensus is important to the feasibility of my research.

People use personal, tacitly owned knowledge in their working lives and this underlying knowledge base informs the everyday practices of professionals. Professionals are also working with more open, formalised and explicit knowledge; that which can be openly observed for example, in the content of a lesson plan. Knowledge which combines the codified and the personal allows individuals to handle complex situations in appropriate and adaptive ways. Eraut (2004) clarifies that codified or propositional knowledge must be changed to fit individual situations and this involves the use of TK. TK is recognised as important in enabling actions; for example, teaching actions in classrooms where time is short and prolonged deliberation is not possible.

TK has been likened to that of riding a bicycle; once the rider can stay up then s/he can be said to be a competent cyclist; however, to ask the rider to explain the exact knowledge acquired is more difficult. This feeds in to the debate as to whether TK includes or is similar to *skill* (discussed further in section 2.2.3). Toom (2012:628) highlights the

inconsistency present in the literature as she points to 'Niiniluoto as well as Agyris and Schön see[ing] skill as a stage of development that precedes knowledge, while Eraut (2004) sees skill as a learned action that was initially explicit but that has subsequently become routinised [or tacit]'. Taking the first version here; if skill is a tacit knowing, which the knower cannot tell (as yet), then this may pose difficulties in accessing the knowledge being used. However, if the skill is a series of actions for which the knower has underlying reasoning then this could provide a useful and accessible source of learning, even if the knowledge is tacit (subconscious or indeed temporarily forgotten) and in need of the right questions to uncover the right information. Eraut (2004:119) asks 'to what extent can the knower tell?' and suggests TK can be accessed via facilitating the telling and gaining sufficient information to infer the nature of the knowledge.

Therefore one can conclude that TK is accepted as being an important resource to people, especially in everyday and professional activities. TK may be an opaque form of knowledge which is more difficult to access and generalise from due to the nature of it being very personally owned. However, the extent to which TK plays a role in allowing people to perform in the workplace is recognised as considerable (Sternberg and Horvath, 1999; Westera, 2001; Eraut, 2004; Toom, 2012). This recognition was a driving factor in my decision to investigate TK in ST learning.

Within my research TK is defined as a personally owned form of knowledge which can support appropriate and responsive action in classrooms. It is often sub-conscious but is seen to be a form of knowledge which is able to be reflected upon and explicated. For further information on how TK is defined within this study, see Figure 2.1 on page 32.

2.2. Tacit knowledge in teaching

Firstly, this section identifies the fact that there is disagreement over a typology of teaching knowledge (section 2.2.1). Secondly, the place of TK in the process of teaching is discussed (2.2.2) and this is followed by an outline of whether teaching is largely skill based or knowledge based (2.2.3). Finally, the agreed benefits of STs learning about TK are covered in section 2.2.4.

2.2.1. Different types of teacher knowledge

As previously identified, Winch *et al.* (2013) condense teachers' knowledge base into three areas: technical knowledge, critical reflection and situated understanding, with each of these areas said to be 'insufficient on its own' suggesting teachers require all three areas to work effectively. Other types of teacher knowledge identified include: pedagogical content knowledge (Shulman, 1986), which combines the what and how of teaching and Verloop *et al's* (2001) practical teaching knowledge categories; covering pupils, teachers' personal beliefs and educational context as interrelated concepts. Teaching knowledge is contested and this is reflected in the different teaching standards for the four nation states in the UK which 'clearly reflect different, declared conceptions of teaching and the professional knowledge of teachers' (Beauchamp *et al.*, 2015:164).

The three areas of teaching knowledge as identified by Winch *et al.* (2013) have been drawn upon here as they provide a useful way to conceptualise and frame TK against other types of teaching knowledge. Technical knowledge, critical reflection and situated knowledge are described in more detail below:

Technical knowledge is that which can be teachable, enabling control and predictability in the classroom (Nussbaum, 2001). They are set ideas which can offer procedural understanding for teachers and are popular for those wanting a best practice guide or toolkit.

An example of technical knowledge can be seen in the documentation of the National Strategies 1997-2011 (DfE, 2011) in England, which were published by central government as a guide for teachers in what was considered to reflect best practice in teaching. These strategies were published to enable the practitioner to plan and control; also to explain and predict the success or otherwise of an intervention. Technical knowledge can help teachers who seek universally applicable teaching ideas and the 'right' approach. Technical knowledge is a form of codified knowledge which, as mentioned in section 2.1, can be spoken and agreed upon by a practicing community (Eraut, 2004).

Critical reflection on practice was popularised by Schön's (1983) notion of reflection-in-action. Teachers who are able to use theoretical ideas within their practice; to try new approaches and to then evaluate the success or otherwise, can be said to build critically reflective knowledge. This is an area of knowledge which can build self-efficacy in teaching and create 'teachers as agents and source' rather than 'objects of reform' (Winch *et al.*, 2013: 4).

A popular form of critical reflection is embodied in action research where teachers become researchers of their own practice looking to use evidence from various sources (e.g. colleagues and pupil feedback) in order to continue to improve their teaching and the learning experiences for their pupils. Action research is often accredited to Lewin (1946) and has the teacher as a researcher involved in discussion, decision, action,

evaluation and revision. Ideas on teacher-as-researcher were developed by the work of Stenhouse (1975: 144) which encouraged teachers to 'systematically question [their] own teaching as a basis for development'. The teacher-as-researcher approach recognises that teaching expertise is not 'superior teaching knowledge already gained' but expertise in 'seeking to understand the world, including one's own practice' (Stenhouse, 1983: 157).

Situated knowledge, taken as the third area of teaching knowledge is also referred to by other terms such as implicit understanding, intuitive knowledge, phronesis and includes TK.

The term *phronesis* is often linked to practical understanding and can be traced to Aristotle, who spoke of 'a true state, reasoned and capable' (Aristotle cit. in Flyvbjerg, 2001:2). Elliot (2002:381) develops this by saying, 'phronesis addresses the particularity of things and situations, it addresses their distinctive conditions so that someone can decide how to move'. This is to say that teachers need personally owned wisdom (TK) relevant to the practical act of teaching in order to practice in a fluid and reactive manner in the classroom (Westera, 2001). Classrooms are constantly changing and teachers' decisions require a multidimensional and simultaneous approach not available via deliberative reasoning due to time constraints. Situated knowledge is comparable to 'knowledge in action' (Schön, 1983: 50), which teachers utilise to make their everyday decisions in classrooms.

The works of Hagger (1995) and Hagger and McIntyre (2006), both of which stemmed largely from an empirical research project carried out by Brown and McIntyre (1993), propose a view of what is termed 'professional craft knowledge' (PCK). The description of PCK below is taken from Hagger (1995: 18) and is applicable to TK; showing how PCK and TK share similarities:

- embedded in, and tacitly guiding, teachers' every day actions in the classroom
- derived from practical experience rather than formal training
- seldom made explicit
- related to the intuitive, spontaneous and routine aspects of teaching rather than to the more reflective and thoughtful activities in which teachers may engage at other times
- reflected in the core professionalism of teachers and their 'theories in use' rather than their 'extended professionalism' and 'espoused theories' (Brown and McIntyre, 1993:36)

Hagger and McIntyre's (2006:37) use of PCK emphasises that much of this knowledge is tacit in nature:

> *The craft of interactive classroom teaching is dependent for its necessary fluency and for its effectiveness on very personal and intuitive judgements, on holistic schemas, on selective perceptions and on thinking and knowledge which are overwhelmingly tacit and barely conscious.*

Eraut (2000: 118) refers to 'most authors using the term tacit knowledge tend to treat it as a catch-all category, without seeking to define it any further'. It is clear that tacit teaching knowledge has been referred to in many different ways (for example, situated knowledge and PCK) with slightly varying meaning and emphasis. However, the common characteristics which prevail are what concern this study. The common characteristics

which are assumed within this study are outlined in Figure 2.1.

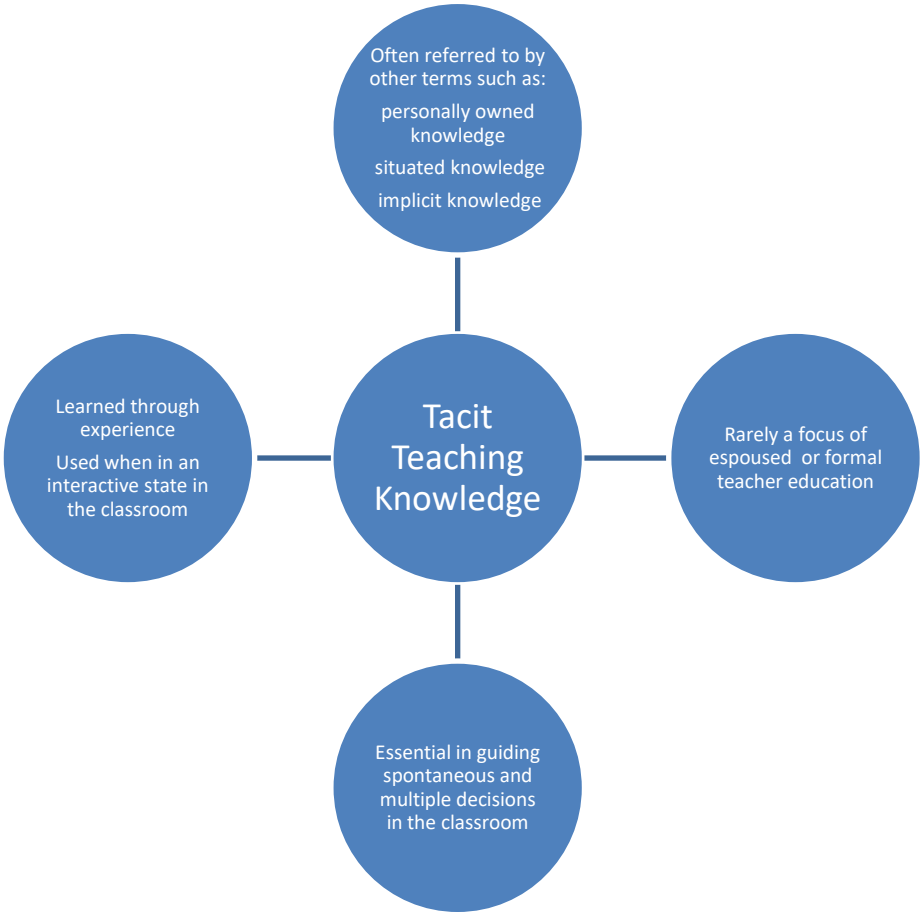


Figure 2.1. Assumed characteristics of tacit teaching knowledge for use within my study.

It is also acknowledged that to classify types of knowledge; such as technical, reflective or situated, can be an imprecise science. As previously mentioned there are other types of teaching knowledge recognised and the boundaries between categories of knowledge can be fuzzy or overlapping.

2.2.2. The importance of tacit knowledge in teaching

Experienced professionals at work will have acquired more than propositional knowledge. They will have a memory bank of scenarios which they have been part of and responded to. This memory bank is a type of personally owned knowledge which can help support

future decision-making and therefore is a key factor for professional development. All knowledge can be said to be personally owned; however, for the purposes of this study personally owned knowledge is also taken to mean the knowledge which teachers have come to understand in very unique or distinctive ways which are less likely to be found in text books, journals or as the formal content of teacher education courses. Much of this personally owned knowledge will be tacit in nature; rarely made explicit and discussed infrequently but relied upon heavily in day to day proceedings in school.

Teachers need to be able to respond to rapidly changing, complex and context specific situations and they utilise personally owned knowledge to inform these responses. TK can be used alongside teachers' propositional knowledge supporting and enabling them to perform in the classroom. In the field of education the use of TK is said to be of great importance as experienced teachers have reached the point where they trust a 'knowing in action' (Schön, 1983: 50). Teachers' use of TK in the classroom is confirmed by Martin (2007: 152) who states, 'the knowing is tacit, implicit in the action, and interactive with both action and outcome'. Kennedy (2006: 35*)* found when teachers were asked to elaborate on their teaching (beyond immediate impressions), their responses revealed this knowing-in-action with 'another layer of thought, consisting of accumulated principles and strategies— rules of thumb about how to achieve certain goals, how to respond to certain situations'.

Teachers have been said to make approximately 1000 decisions a day (Jackson, 1971) and for a long while it has been recognised that teachers cannot be consciously aware of all that happens and must make simultaneous decisions without deliberation (Clark and Yinger, 1987). Teachers have 'complex, usually tacit, knowledge that informs and is embedded in their sophisticated and everyday practice' (Burn *et al.*, 2007: 430). This

embedded TK is confirmed by other authors (Eraut, 2000; Jones, 2001; Hagger and McIntyre, 2006; Parker-Katz and Bay, 2008; Velzen *et al.*, 2012) and is a source of knowledge which could be valuable in learning to teach. Jackson (1990:11) likens the role of a teacher to that of a judge, a supply sergeant, a time-keeper and U.S traffic cop. The teacher's responsibility is 'channelling social traffic', with all of the decisions being responsive to the crowded classroom conditions and the immediacy of the teaching concerns. Whether this rather authoritarian perspective on a teacher's role is agreed upon is up for discussion; however, what is relevant is that teachers have so many decisions to make they cannot be made in a chronological, one-by-one fashion. This is where 'knowing in action' or 'inherent intelligent action' (Schön, 1983:50) must be used in order to furnish the teacher with possible ways forward in classroom settings.

Wilson and Demetriou (2007) outline three types of judgements that new teachers make at the start of their practical experience (See Table 2.1). The three types of teaching judgements correspond, in part, to the amount of time available for the teacher to make the judgements. The types are tacit, reactive and deliberative.

Tacit Judgements	**Reactive judgements**	**Deliberative judgements**
'Hot' action	Judgements linked to the actions and the classroom environment	'Cooler' action
Judgements based on intuition	Respond to affective and social contexts	Judgements based on deep understanding
Mainly emotional responses	Knowledge *of* action	Cognitive domains are involved
Knowledge *in* action		Knowledge *for* action
'Act' like a teacher		'Think' Like a teacher

Table 2.1. Three types of judgements (Wilson and Demetriou, 2007:224)

Tacit judgements include those required to act in a fast paced, dynamic environment and include knowledge in action, which Wilson and Demetriou (*ibid.)* say rely mainly on emotional responses and involve acting like a teacher. Teachers' experience builds intuition which can then be used to make decisions based upon 'rules of thumb' (Kennedy, 2006: 35) in classroom situations where conscious, deliberative judgements are not possible.

It is the consensus over the importance of TK in the act of teaching which reinforces the purpose of my research. TK is important in teaching and therefore is important to STs in learning about teaching.

2.2.3. The link between tacit teaching knowledge and skill

Referring back to the difference between ITT and ITE (see page 19) a skills-based approach can be linked with the training of teachers (ITT); conceptualised as a set of learned behaviours which can be taught by an 'expert' teacher. The use of the terms 'skill' and 'craft' in teaching have been used with a range of diverse meanings, in some cases carrying derogatory meaning; with Hagger (1995:17) noticing 'craft knowledge set in unfavourable comparison with professional knowledge'. Berjaard and Verloop (1996: 276) state that teaching is not merely a practical skill and that teachers' craft knowledge 'encompasses much theoretical knowledge, though adapted to the relevant teaching situations'. More recently, McNamara and Murray (2013) view educational policy reflecting a view of teaching as a craft, rather than an intellectual activity implying a separation of the two.

For many an interdependence of knowledge and skill is important with Wilson (2013: 44) challenging a practical, skills based view of learning to teach stating that 'becoming critically reflective so that one can make deliberative judgements about classroom interactions goes beyond mimicking other teachers' and Westera (2001) agrees there is a place for skill and cognitive function to work interdependently. Fenstermacher (1994: 26) makes a distinction between two knowledge types, episteme and techne, (here, relatable to knowledge and skill respectively) and claims that whilst these two are distinct, they are still interdependent.

Writing on cognitive process and the difference, or similarity, between skill and competence Westera (2001), raises the importance of conscious thinking [in teaching] and rejects the idea that skill, whilst often taken, at its most basic, to mean a form of repetitive, observable actions, cannot be separated from competence (often seen as skill tied together with cognitive function). This highlights that, in teaching, the importance of knowledge, understanding, and the ability to reflect and make informed decisions, is inseparable from the physical practicalities of being able to act and do.

For some, the ability to *act* as a teacher is an important skill (Lampert, 2010) with less importance placed upon knowledge, understanding and reflection. Lampert (*ibid.)* maintains that teaching is a learned set of skills, which can be tried and rehearsed. There is even a notion of teaching being learned in a generalised manner, 'learned in the abstract, as separate skills', questioning the need to try these skills 'with particular children in particular circumstances' (*ibid.*: 22). The importance of knowledge either explicit or tacit is significantly underplayed by Lampert and is contrary to developing teachers who are able to 'subject[ing] their own practices and the assumptions on which they are based to critical scrutiny' (Burn, 2006: 256-257).

It is acknowledged that skilled teaching behaviours and knowledge about skilled teaching can be difficult to clearly separate as 'such strong interdependence of cognitive skills and behaviour causes confusion about the essential and different meanings of the two concepts' (Westera, 2001:78). It is perhaps futile to say one is better than the other, or that a teacher can operate effectively without both knowledge and skill; including the ability to understand when to use which resource. The ability to understand when to use which resource is highly dependent upon context.

Discussing the increasing acknowledgment regarding the importance of context in teaching, Elliot (2002:19), referring to the idea of phronesis, states:

> *Educational research [...] has attempted to draw conclusions that held up across contexts. With the advent of Schwab's (1969) important essay on the practical, the ground shifted. Those interested in curriculum matters and in teaching began to recognize that the conditions teachers addressed were each distinctive. As a result, abstract theory about general relationships would be of limited value. [...] Each situation, even in the same classroom, was unique. It was a grasp of these distinctive features that the teacher needed, not in order to produce knowledge about teaching but, rather, to make good decisions in the classroom.*

This quote is extremely relevant to my research as the recognition of the individualistic nature of teaching knowledge and contextual factors, rather than generalised theory applicable to all teachers, sits at the heart of the research design.

TK goes beyond learning practical skills and is not about rehearsing procedures or set routines. It is a type of knowledge which can be identified as personal and often learned in non formal ways; enabling a teacher to think and act in an iterative and fluid manner in

the classroom. 'Tacit knowledge of teaching is largely acquired informally through participation in authentic classrooms, through guided positive learning experiences' Wilson (2013:42). My research seeks to build upon the ideas of context, skill and knowledge by initiating and studying a guided learning experience designed to allow STs to understand more fully the links between contextual factors of the classroom and the decision making processes of their mentors.

2.2.4. How can student teachers benefit from learning about tacit knowledge?

It is generally agreed that learning about experienced teachers' TK is of benefit to STs (Fenstermacher, 1994; Eraut, 2002; Eraut, 2004; Toom, 2006; Hegender, 2010; Dudley, 2013). This section is designed to expand upon what these benefits are.

Two methods of learning are proposed by Eraut (2004):

- Formal
- Non-formal (termed by Eraut as such because 'informal' carries too many other connotations including dress, appearance etc.)

It is the formal method of learning which is given the highest importance by learners themselves; however, most learning takes place in non-formal ways and that this is largely invisible or taken for granted (Eraut, *ibid.)*. Eraut also suggests that the more non-formal elements of learning for STs could be as, if not more, important than the more formal aspects of ITE courses and that STs are motivated to be seen as a 'real' teacher from very early on during ITE programmes; achieving this by rapid non-formal learning.

There is agreement on the need of STs to be seen as 'the real thing' (Hagger, 1995; Lampert, 2010; Nilsson and Van Driel, 2010). This is elucidated by Van Velzen *et al*. (2012:231) stating that 'learning to teach is as much about acting as a teacher as it is thinking like a teacher'. Some of the routes to achieving this are to learn, in non-formalised ways, the culture and social capital which are used in a specific school context. The culture and social capital of a school may be, in part, available through documents and in policies although much of this will also be held as tacit understanding within the school group members. Bourdieu (1999:339) used the term 'doxa' and emphasised that 'partaking of the doxa, of the ordinary vision, which is also the most widespread and the most widely shared, they [e.g. the STs] are most likely to receive the approbation and applause of the greatest number'. It is non-formal learning which can lead to a fast awareness of how to 'act' as a teacher even before any understanding of why these actions may or may not be important. Whilst non-formal learning may play a role in STs early development, caution must be raised here as relying simply on social acculturation when learning to teach is dangerous due to the need for the acquisition and questioning of experiential knowledge in order to inform practice (Desforges, 1995). Buitink (2009) warns against a master-apprentice, or mimicry approach with such an approach highlighted by Stones (1992: 141) as 'mediocre pedagogy'. ST learning must encompass much more than mimicry, instead it can be seen as:

> *a process of learning to be, see and respond in increasingly informed ways while working in classrooms, i.e. to participate increasingly knowledgeably in the practices of teaching.* (Edwards and Protheroe, 2003:230).

Formal learning programmes on ITE courses can vary depending on the route to qualification chosen and the school placement followed. However, common to most ITE

programmes is 'learning to teach as performance' (*ibid.:* 228), with an emphasis on STs being able to teach 'rapidly and independently' (*Ibid.: 228).* Learning how to teach which includes access to mentors' knowledge *in* action can support STs understanding of what they can see and this is seen as very important by Eraut (2000: 122), who states: 'implicit knowledge can be very powerful indeed even when, as in most teacher training, explicit knowledge is available by the bucketful'.

If TK were to be recognised further and made more explicit on ITE courses there may be greater opportunities to openly discuss experienced teachers' knowledge of practice which may otherwise be left unsaid or under-explored. The TK used by experienced teachers can be a source of learning for STs. As Ethel and McMeniman (2000:89) encourage:

> '*reflective practica must cultivate activities that connect the knowing and reflection-in-action of competent practitioners to the theories and techniques taught as professional knowledge in academic courses'.*

TK can be made explicit to a lesser or greater extent (Eraut, 2000) and it can be useful for STs in understanding more about why teachers plan and act in the way they do. Accessing teachers' underlying reasoning and decision-making helps to provide insight into the values and beliefs about desired teaching and learning outcomes. This has significant potential to educate and guide STs in their knowledge about the links between teaching and learning; and may influence their own practice in future situations which share similar characteristics. Therefore, rather than a set of skills observed and learned, the elicitation of TK for teaching use can add to STs' existing schemata of understanding about how classroom teaching can be enacted.

This research seeks to find out how STs can increase their own knowledge for teaching by accessing and understanding experienced teachers' TK, particularly looking into the factors which encourage the transfer of this knowledge. Tacit teaching knowledge (whilst personally owned) can be discussed in an explicit manner and there are deliberative ways to access experienced teachers' TK. Some suggestions include close collaboration with an experienced person, 'goal-target interviews' and training of model situations (Matošková *et al.*, 2013:6). 'Exploratory talk' (Mercer, 1995:104) is also potentially useful in making TK more explicit and this involves more than one person in discussing an issue or coming to an agreement. Knowledge arrived at through exploratory talk is made more publicly accountable and 'reasoning is made more visible in the talk' (*ibid*.). The agreement over the usefulness of TK in teaching and the possibilities for accessing this knowledge provide confidence for my research focus and the methodology I have followed. Ways to elicit TK are discussed further in section 2.4.

2.3. Learning from experienced teachers

This section looks into the role of mentoring in ST development and the nature of what STs can learn from their mentor.

Mentors have an important role in ST development and the variability in the effectiveness of mentoring has been acknowledged. For example, a study by Edwards and Protheroe (2004:92) found 'little evidence in the research done so far that STs were learning from mentors how to work synchronically or responsively to support pupils as learners'. Their research looked into what mentors could offer STs and also into the systems in which mentoring operates. They found that much mentor-ST evaluation and interaction was

descriptive and only a small percentage of discussions were of a nature which enabled STs to 'work at the edge of their competence' (*ibid.*: 93); most focussing on how to get pupils through the curriculum. Hobson *et al.* (2009: 213) also confirm, from their own meta-analyses, that research into mentoring strategies for shared reflection and STs' professional learning are 'notable by their absence'. Contrastingly, Burn (2006:249) presents findings of mentors who are able to promote reflection and learning in their conversations with STs where they 'do not merely prescribe courses of action, they offer coherent rationales for their suggestions, recognising the merits of alternative approaches and acknowledging the tensions inherent in opting for one strategy or another'.

A variance within research findings in terms of the nature and quality of mentor-ST interactions can be found. However, there is a consensus that experienced teachers in school contexts can play a vital role in enabling STs to put theory into practice; develop an intelligent understanding of pupils and the factors which affect them; make the link between teaching and learning; and to build competent and evidence-based practice which can be critically reflected upon (Hobson, 2002; Burn, 2006; Jones and Straker, 2006; Aderibigbe, 2013; Winch *et al.,* 2013). My research acknowledges the vital role of the mentor in STs school-based learning and seeks to investigate if/how access to mentors' TK can support the development of STs' professional practice.

Previous investigation into how experienced teachers can explicate their own teaching knowledge provides information on the possibilities for STs. Brown and McIntyre's (1993) research reported on the ways in which teachers were able to evaluate their own teaching. Brown and McIntyre sought to facilitate teachers' own articulation of the ordinary, everyday teaching which they do routinely and spontaneously in classrooms.

Teachers' talk, judgements and reasoning about their own teaching actions were linked to goals and objectives and the nature of the pedagogical knowledge in use was, to some extent, accessed. This study gave significant importance to the use of TK in teaching practice and to the possibilities of and potential for this knowledge in ST learning.

Drawing upon the concept of PCK (see page 31), identified as being largely tacit, Hagger's (1995) research revealed a consensus (from the mentors) that their own TK was revealed through an interviewing process. Hagger's work (*ibid.*), also published later in Hagger and McIntyre (2006), is still important as it added greatly to the understanding of how mentors can illuminate teaching for STs. A key feature, in revealing mentors' PCK, was the opportunity to elucidate what was usually taken for granted:

> *'There was [...] a broad consensus among the teachers that the conversations with the students had enabled them [as mentors] to make accessible what they generally took for granted in their teaching and the planning and reasoning that underlay observable teaching'* (*ibid.*: 129).

Hagger's (1995) study sought to determine correlation between certain factors; such as the use of open questioning by STs and the mentors' elaboration of PCK. Although evidence of correlation between the use of open questions and access to PCK could not be established, what was established was the link between a clearly defined purpose and process for STs (in trying to access experienced teachers' craft knowledge) and the context specific, relevant reasoning and knowledge that teachers revealed about their classroom actions and decisions. The ways in which STs were prepared before questioning experienced teachers about their lessons was deemed very influential and said to be an area where 'clearer and more persuasive guidance about the kinds of probing [that] can

give access to richer information about teachers' craft knowledge seems to be needed' (Hagger and McIntyre, 2006: 204).

Where STs can access the TK of their mentors this can support contextual and deeper understanding of observable teaching practice. Mentor reflections of (often taken for granted) actions can promote a greater connection for STs between what is happening in the classroom and the underlying reasoning. Lave and Wenger (1991:109) distinguish between '*talking about'* and '*talking within*' a practice; referring to the enhanced type of learning which can occur in situ (e.g. in school) where learners benefit from participating and talking within a professional, practising community. Within the school community a mentor can offer this in situ collaboration. Parker-Katz *et al.* (2008: 1260) affirm that 'the mentor is viewed as the participant whose experiences, observations and interpretations are deemed highly valuable in understanding the relationship between teaching and learning'.

This section has illustrated the importance of the transfer of knowledge from experienced teachers to STs. Not in a recipe sense, where there can be a guided plan learned and consequently successfully re-enacted, but a developing conversation regarding decision-making and the reasoning behind teaching actions.

2.3.1. The impact of mentoring on student teachers seeking to access tacit knowledge.

With the benefits of a mentoring approach which promotes and supports collaborative learning identified as important, but with the variability in mentoring also acknowledged,

this section looks into the factors which may influence the nature and extent of STs' access to TK within a mentoring relationship.

A mentor's TK has been developed through teaching experience and is largely used, sub-consciously, when in active teaching. This can result in the explication of this knowledge being infrequent or incidental as reflection over a mentor's teaching is less likely than reflecting on STs' teaching. Another reason is that reflecting on teaching has been found to focus on descriptive recounts of events (Edwards and Protheroe, 2004) and 'what do we do next', with conversations that do not address underlying principles (Buitink, 2009). Where STs are seeking to access their mentors' TK, if explication is incidental or infrequent, this can be a limitation to a full understanding of teaching reasoning and decision-making. Contributing to this, mentor teachers can find it difficult to talk about their teaching (Malderez *et al.* 2014: 106), struggle with the language of mentoring (Orland-Barak, 2001) and may show little interest in mentor training (Jaspers *et al.* 2014).

Each individual mentor will have a conceptual understanding of what mentoring is. This understanding can include views on; the strategies for support which should be offered; what a ST should be doing at different stages of a PGCE; the amount of time which should be spent working collaboratively or independently. Mentors will also have views on what TK is and whether it is useful for ST learning or not. In addition to these conceptual variables, the 'variety of organisation and nomenclature within schools' (Punter, 2007: 12) with regard to mentoring systems adds to an idiosyncratic approach which can be 'haphazard and left to chance' (Hudson *et al.,* 2012: 285*),* leading to significant disparities in provision for STs.

One such disparity, which may impact on the extent to which TK is a focus for explication within a mentor – ST relationship, is the perceived notion of power. The ST fits into a

social structure within his/her school and the mentor is part of this structure. During mentoring conversations 'beliefs, understandings, skills, attitudes and dispositions to work and learning are brought to the...conversation by the mentor and [ST]. Each makes adjustments to the other,...but the onus 'to fit in' is with the newcomer' (Punter, 2007: 121). This makes the probability of STs accessing TK heavily dependent on whether or not the mentor views TK as an important element of ST learning, and if recognised as plausible to uncover. With the ST focussed on fitting in and acting like 'the real thing,' (van Velzen *et al*., 2012:231) challenging a mentor's notion of what is and what is not important to discuss is unlikely. Where STs are under pressure to be fit to teach from the start and to be 'proxy teachers' (Edwards and Protheroe, 2004: 194) this makes being a novice very difficult, and can limit mentoring discussions to the 'day to day' concerns other experienced teachers may be concerned with. Where a mentor is open about the need to discuss basic teaching and learning concepts, and the ST can be open about his/her uncertainty over observed teaching events, it may become more likely the ST will investigate their mentor's TK in order to understand events more fully.

In a mentor-ST relationship the power balance is unequal and it is the mentor's own view on the applicability and accessibility of TK which may determine the ST's access to this knowledge. A mentor who holds the notion that TK is difficult to articulate because 'it is embodied in skills that are located inside practices, ways of doing things' (van Manen, 1995:45), may not consider mentoring strategies which seek to explicate this knowledge for others' use. Indeed, it has been suggested that when mentors are asked to account for their actions and to reveal their knowledge-in-use at the time of teaching, they provide, not the TK which informs and guides their practice, but instead the espoused

language which they feel is expected of them (*ibid.)*. The difficult nature of making TK available for others' understanding and use is recognised (Molander, 1992) and, transferred into a mentoring context, can make focussing on the explication of TK difficult for an ST.

2.3.2. A strategy to learn from experienced teachers

This section outlines a strategy for STs to uncover the tacitly held teaching knowledge of their mentors.

How STs can learn to teach from their mentors has been an important area of study for many years, with research into the ways in which teacher knowledge can be made available, or accessible, to STs being a common theme (Verloop *et al.,*2001*)*. We have known for a long time that for a prospective teacher to observe a mentor is not sufficient to reach this goal (Calderhead, 1988) and that a more structured approach is required.

'Situated cognition' is a term first used by Brown *et al.,* (1989) and since used by Ethel and McMeniman (2000) who carried out a study entitled: *'Unlocking the knowledge in action of an expert practitioner'*. This study presented a 'cognitive apprenticeship' model where nine STs were involved in an intervention aimed at developing a deeper understanding of the procedural (identified as usually tacit) knowledge of experienced teachers. The STs were asked to watch video recordings of an experienced teacher (referred to here as teacher A) at work in the classroom, followed by an interview with him discussing his actions. These were referred to as stimulated recall (STR) interviews. STR interviews are said to 'prompt participants to recall thoughts they had whilst performing a task or participating in an event' with 'memory structures being enhanced, if not guaranteed, by

use of a prompt' (Gass and Mackey, 2007:95). The term 'stimulated recall' was first used by Bloom (1953) in a paper which discussed the use of cues to assist memory and the discussion about a previous event. The recall was best (95% accuracy) if the interview was held within two days of the event itself.

In Ethel and McMeniman's study (2000) teacher A was interviewed about his teaching actions in order to access his thinking, considerations and objectives at key points of the recorded lesson. The outcomes of this study, as indicated by vignettes from the participants, suggest the intervention was a success in allowing STs access to the procedural, usually tacit, knowledge of experienced teachers. One ST noted:

> *'I have seen heaps of teachers teach, but I don't think I've seen anyone reflect on their own teaching like you [researcher] asked him to [do]. This is the first time I have been able to sort of get inside a teacher's head and get a glimpse of all the things he thought about which influenced what we were seeing as his teaching'* (*ibid.*: 93).

This is a source of evidence suggesting that it is possible to make tacit teaching knowledge more explicit for STs. However, it must be acknowledged that the sample was small and that teacher A was the only teacher involved.

The objectives upon which Ethel and McMeniman based their research feed in to the ideas and questions guiding my research. This includes discovering more about the ways STs can unlock the TK of experienced teachers in order to become more knowing and better practitioners.

Ethel and McMeniman's (*ibid.)* findings show that STR interviews can be a useful method for reflecting upon observed teaching and can focus discussions upon identified teaching

incidents; narrowing the issue under focus. A similar STR method has been used in my research, which aims to encourage STs to access not only the observable behaviours, but also the minds of their mentors. STR interviews have been proven to help STs access the thinking of experienced teachers and this has been identified as contributing 'significantly to their understanding of good teaching' (*ibid*.:93).

STR interviews have been used elsewhere in educational research (Tondeur *et al.*, 2013; Stevenson, 2015; Endacott, 2016) and reveal similar advantages in that the teachers' memories are tapped into, follow-up conversations can be more specific and the stimulus (e.g. video or recorded notes) helps to trigger the sequential thought processes the teacher was engaged in at the time of teaching.

It is clear that STR interviewing has the potential to encourage useful professional conversations and, in particular, to facilitate mentors in remembering and sharing details regarding their teaching; therefore allowing STs to tap into experienced teaching knowledge. More information and justification for the use of STR interview methodology can be found on page 71.

2.4. Making the tacit explicit

This section evaluates the potential for explicating mentors' TK including existing ideas on the STR interview as a method.

Major considerations in the literature concerning tacit teaching knowledge include the methods of and potential for accessing it, and the associated problems of researching the topic. Eraut (2000) points to the difficulties in getting respondents to describe their personal knowledge or 'know-how' (*ibid.*: 119) and Fugill (2012: 2) confirms this

inaccessibility stating: ‘we possess expertise that may have originally been learned verbally and explicitly, but has subsequently become tacit, an unacknowledged part of our [...] practice’. Fugill considers that ‘articulation of such knowledge rarely takes place and can be difficult’ (*ibid*.). It is largely agreed that there will always be an element of knowledge or understanding which will remain personal and ineffable (Brown, Collins and Duguid, 1989; Fenstermacher, 1994; Elliot, 2002; Dudley, 2013).

Whilst TK may be used subconsciously by teachers in the act of teaching we may expect that they are able to reflect on their functioning (Calderhead & Gates, 1993). The method of reflection and extent to which this happens are not well researched; Parker-Katz *et al.* (2008: 1260) suggest that the nature of the actions that mentors take to transform their knowledge is ‘a missing aspect of our knowledge of mentoring’ and this provides further motivation for the focus of my research.

There is evidence to suggest that accessing TK is possible and that making the implicit more explicit can be done. Eraut (2000:120) provides guidance on ways to elicit TK including: using mediating objects, e.g. picture or video; regular mutual consultation; a relationship within which explanations are expected and; an informal relationship where work based issues can be discussed outside of a formal setting where ‘riskier’ comments may be possible. On this latter point there are corresponding findings in Hagger’s (1995:310) work where STs found more formal settings to discuss teaching ‘artificial’ and ‘at odds with a more natural way of working’. A formal arena may increase the presence of espoused theories (mentors and STs saying what they think they *should* be saying), possibly reducing the elicitation of TK. Hagger does go on to confirm that it is possible to gain access to knowledge which is not generally made explicit, and which teachers are not

necessarily always conscious of using 'given an appropriate strategy' (*ibid.:*36). This study seeks to devise and evaluate the use of such a strategy.

Others have successfully revealed and used TK in educational research (Kagan, 1990; Stanulis, 1994; Eraut, 2000; Ethel and McMenimann, 2000; Dudley, 2013) and as TK is recognised as an important source of knowledge for teachers it is a worthwhile area of research. Situated cognition (and the use of STR interviewing) has been highlighted as a means to 'make explicit the typically tacit knowledge of expert teachers' (Ethel and McMeniman, 2000: 90). STR interviewing has also been used to explicate TK by Toom (2006) in her study of tacit pedagogical knowing, which provided qualitative data revealing how teachers reflected upon chosen pedagogic incidents in recorded lessons. Both of these studies reveal the potential for STR interviewing to be an effective method for accessing TK.

2.5. How my research follows on from the literature

Teacher knowledge, as an area for research, was described, in 2001, as 'quite new' (Munby, Russell and Martin, 2001: 877); however, there is research to suggest how important TK is in teachers' professional work (Hagger, 1995; Burn, 2007; Eraut, 2004 & 2007; Dudley, 2013) and it follows that accessing this knowledge is useful for STs.

Research has shown mentoring to be important to ST development; both in the training year and in future professional development (Richter *et al.,* 2013). The need for more guidance about the kinds of probing that can allow STs to access teachers' knowledge has been called for (Hagger and McIntyre, 2006) and it has been said that mentor teachers do not generally explicate their own knowledge base of learning and teaching to STs (Edwards & Collison, 1995). My research follows on from these findings as it seeks to

further investigate the role of TK in ST learning and what is possible in terms of accessing experienced teachers' TK.

My first research question asks what is the role of TK in ST learning. The existing literature suggests that TK can play an important role in allowing STs to unpack and understand the 'rules of thumb' (Kennedy, 2006: 35) employed by experienced teachers. Accessing this TK has been said to prevent STs from 'mindlessly imitating their mentor teachers' teaching or from misinterpreting their mentor teachers' lessons' (Zanting *et al.,* 1998:18). My research will seek further evidence of the role TK in ST learning on a university-based PGCE.

My second research question asks what are the ways in which STs can access TK from their mentor or more experienced colleagues. This question will be examined further by asking STs directly how they access TK and, building upon previous studies which have supported and facilitated explanatory pedagogical discussions (Hagger, 1995; Ethel and McMeniman, 2000; Dudley, 2013), this study will follow four cases to investigate the possibilities for STs in accessing the TK of their mentors.

My third research question asks what factors encourage STs to develop their understanding of TK for teaching use. This last question links to work on potentiating learning environments (Claxton and Carr, 2004) and opening opportunities for ST learning (Bransford *et al.* 2000) in that I will be looking for the circumstances which encourage STs to access their mentors' TK. Listening directly to STs and mentors will be an important element in finding out answers to this question. This will involve examining evidence from four case studies to see when and how TK is explicated through STR interviewing.

The methodological choices used within this study in order to investigate these questions are described and explained in the next chapter.

Chapter 3 Methodology

3.1. Theoretical position

The aim of my research is to gain detailed insight into interactions and language between STs and mentors which could add to a body of knowledge about the role of TK in learning to teach and how TK can be accessed, transferred and used by STs. My research, whilst applicable to those working in ITE, does not follow a teacher-as-researcher approach (Stenhouse, 1983) as identified on page 29. The qualitative design gathers data which are rich in depth, from a small group of participants and seeks to find meaning by analysing language and interactions. My research builds upon a constructionist view of social reality meaning that the participants involved are understood to be constructing their own realities; these realities are local and experientially based and depend upon the individuals holding them (Punch and Oancea, 2014).

The qualitative research design is both interpretive and idiographic. Interpretive in that it is believed all participants within the research hold their own understandings, or versions, of reality and the aim is to uncover these understandings, not present a factual truth able to be reliably repeated. There are no clear cause and effect rules being sought. There is a need to grasp the 'subjective meaning of social action' (Bryman, 2008: 16) therefore an interpretivist approach able to reflect the 'distinctiveness of humans' (*ibid*.) is suitable for my research. STs and mentors worked together in social settings creating realities which were not 'abstract objects but dependent on the inter subjectivity between [them]' (Burgess *et al.*, 2006:55). Data remains closely linked to the individuals from whom they

were gathered, evidenced in the presentation of traceable quotations in Chapters Four and Five.

An idiographic approach recognises that knowledge is individually developed in small, local settings with the specifics of particular cases seen as important (Punch & Oancea 2014). Small settings and a focus on the specifics of interaction between participants are characteristic of my research, which was designed to allow STs and mentors to work together in the natural setting of their own school departments without external (researcher) observation or presence.

Research into classrooms and schools requires an approach which appreciates the 'immense complexity of human nature and the elusive and intangible quality of social phenomena contrast[ing] strikingly with the order and regularity of the natural world' (Cohen et al. 2011:7). Therefore, a more positivist approach, for example focussing on analysing relationships between selected variables in order to assess causality, often utilising quantitative data (Robson & McCartan, 2016), has been rejected as inappropriate for my research.

An epistemological question regarding the nature of knowledge which can be accessed through my research is whether I can claim to have found new knowledge which can be useful in the field of ITE. The knowledge to be found in a research study such as this can be seen to be one truth of many possible truths and the likelihood of establishing an objective set of generalisable facts is slim, and is not an aim of my research. The research methodology uses a constructionist view of the world where there is 'active involvement of people in reality construction' (Bryman, 2008:19) working, talking and learning within organisational structures yet determining their own personal realities out of interaction, reaction and reflection. My research investigates social learning situations where I aimed

to capture the individual realities and possibilities for TK in the ST learning process. Each case study was unique and each its own version of social reality.

A relevant debate informing the decision to use a qualitative research methodology which appreciates constructionist notions of the world is Hammersley's (2011) response to Hillyard (2010). This debate makes it clear that the ontological viewpoint of researchers matters and affects not only their view on how the world works, but what is possible in terms of research. Hammersley draws out confusion in Hillyard's paper stating that 'any suggestion that there can be conflicting yet true perspectives must be resisted, since it undermines the very possibility of inquiry and knowledge' (Hammersley, 2011: 807). An alternative view is that there can be multiple realities in social scenarios (Radnor, 2002) and an external reality is not discoverable. In my research, meaningful and valid answers (see section 3.5 for a discussion on the validity of my research) arise out of following a defensible and iterative qualitative methodological approach. Where there is potential for multiple realities to exist this can, in itself, add to an ongoing accumulation of knowledge regarding TK in ITE. This is to recognise that all knowledge is, in some way, individually understood.

A priori themes which I have brought to this study are recognised and my own preconceptions following years working in ITE are acknowledged, as these influence not only the research design but also all aspects of the research process. The preconceptions and a priori ideas which may have influenced my research are illustrated in a mind map; shown in order to externalise and acknowledge these ideas (see Figure 3.1). Main features of this mind map include an assumption of the importance of mentoring style and how a mentor views his/her role can be highly influential. Also, I see the emotional and affective dimension of a ST as an influential factor in learning to teach. The mind

map also shows my preconception that STs have great potential in determining what is useful for them (as teachers) to learn. This has influenced the design of the interviewing procedure by placing STs in the position of interviewer, outlined later in this chapter.

Figure 3.1. Researcher preconceptions and a priori themes.

My research followed an inductive approach which had the flexibility to evolve. An inductive approach to research is not always linear, with the findings able to shape the research process. The initial study proved to be very successful as a data gathering

exercise and was built upon throughout the main study. This emergent design led to initial study data being included along with the main study in the final data analysis and conclusions.

There are a number of key studies within a similar sphere of interest which were influential in supporting the research design (Hagger, 1995; Eraut, 2000 & 2007; Ethell and McMeniman, 2000; Toom, 2012). In particular Hagger's (1995) work on PCK which raised the importance of mentors and the benefits of supporting STs to successfully question experienced teachers; Eraut's (2000) work on the importance of TK in professional work and learning; Ethell and McMeniman's (2000:90) intervention which promoted STs in using 'cognitive apprenticeship' and, lastly, Toom's (2006) study which revealed how influential TK was in teachers' work.

3.2. The Research Process

This section outlines the research process which was followed, clarifying the stages and chronology of the research activity. Figure 3.2. is a visual representation of the research process. Further detail of each stage of the research follows in section 3.4.

At the start of the research process a focus group was carried out as it was a reasonably quick and practically straight forward way of gaining access to several people's viewpoints on TK. The focus group was designed to gather preliminary data on how TK was understood and if it was a feature of the STs' school based practice. The focus group was also an important step in ascertaining what might be possible, in terms of research questions and research methods, moving forwards. The focus group established some

ideas on how STs understood TK and how this featured in school; leading to the design of a subsequent initial case study.

The initial case study, which followed the focus group, consisted of a ST and his mentor carrying out a lesson observation and stimulated recall (STR) interview. The ST observed his mentor teach and carried out an interview with a view to explicating the mentor's TK in use at the time of teaching. The interview took place in the mentor's classroom and was successfully recorded and transcribed. This initial case study revealed promising potential for an ST to lead an interview and to explicate TK.

Following the initial case study, a wider sample of STs and mentors were asked (by means of online questionnaires) a series of questions on TK. These questions aimed to gather more data on the importance given to TK in a practical teaching context, if and how TK featured in ST learning, and what actions mentors and STs took in order to make this type of knowledge explicit.

Finally, three more case studies followed a similar procedure to that of the initial case study, undertaking one lesson observation and one STR interview each. Interviews focused on the STs explicating the mentors' TK in use at the time of teaching, with mentors providing further detail and reasoning for their classroom actions. These interviews were held within two days of the teaching, in participants' school departments, and all three were carried out over a period of three weeks.

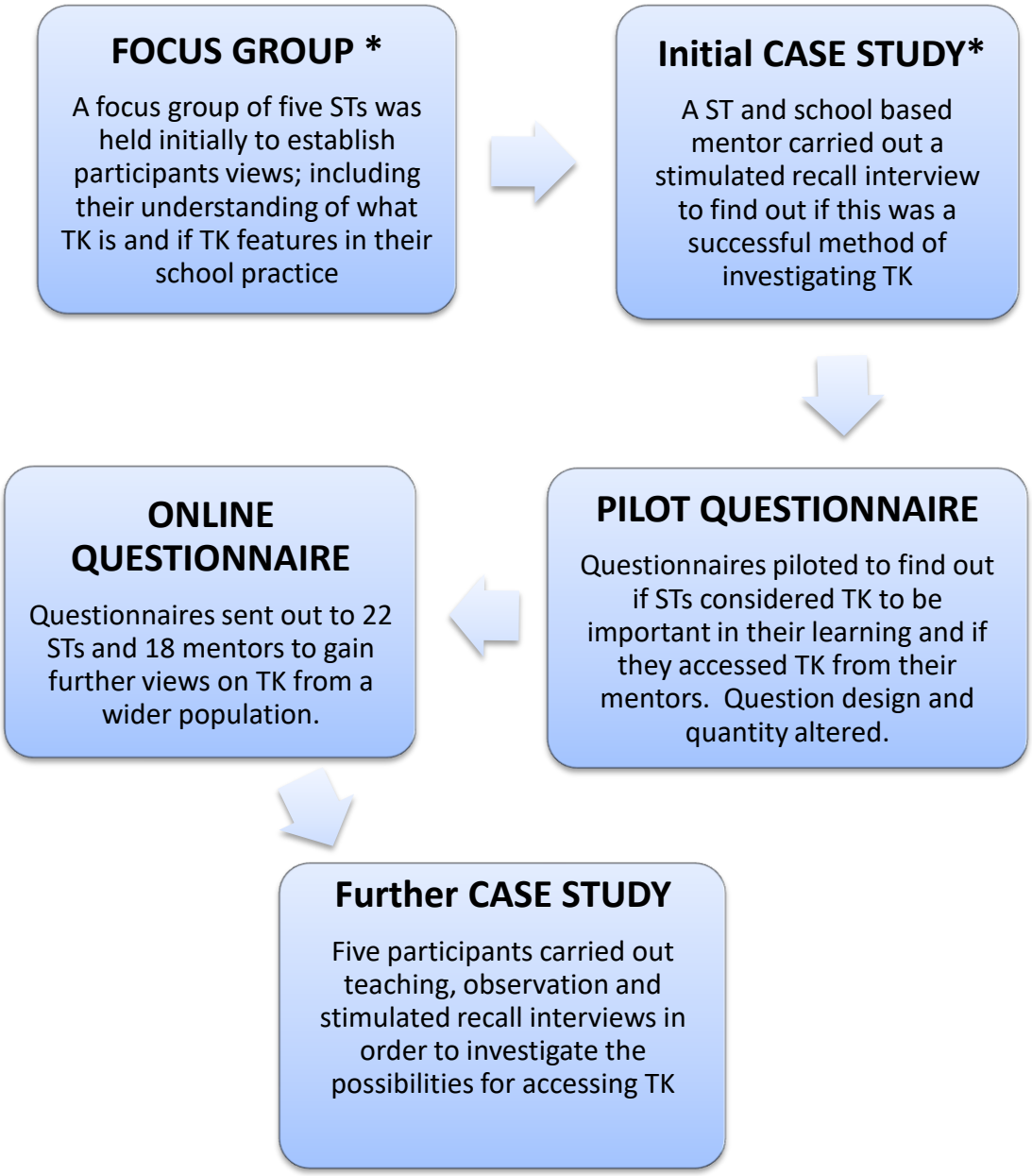


Figure 3.2. A summary of the research process

* The first two steps in the research process were classed as an initial study. More details can be seen in section 3.4.1.

3.3. Methodological approach

3.3.1. Case study

My research followed a multiple case study approach which looked into four pairs (mentor and ST being one pair). The case studies provided rich qualitative data enabling revealing insights and further knowledge into the place and use of TK in learning to teach. Case studies 'provide unique examples of real people in real situations' (Burgess *et al.*, 2006: 59) and this was therefore a useful way to investigate context specific scenarios elucidating how TK is understood, transformed and used. Following four pairs allowed me to focus on gathering detailed information compared to taking more participants and only having the resources to gather superficial data.

By using case study I was able to investigate context specific possibilities and the uniqueness of individuals working together towards a common goal (learning to teach). Case study allowed access to the minds of individuals as prolonged conversation was possible. Reasoning and judgement were critical factors to delve into in my research, and case study was suitable for acquiring this information. When using a case study approach detailed qualitative evidence is important in producing relevant and valid conclusions (Eisenhardt, 1989) and the transcripts produced from the interviews, obtained as part of my research, provide such evidence (see Appendix D for an example).

A case study approach was chosen as they can be strong in reality and full of descriptive material which can offer insights into new and old questions and, potentially most importantly, can be a step to action which initiates development or change (Adelman, 1980). Punch and Oancea (2014) outline four main strengths of choosing to utilise case

study as a research method, including providing exemplary knowledge and making an important contribution to other research methods. My research includes additional data from questionnaires which have been used to strengthen findings from the case studies. The cases provide examples of what is possible when trying to access TK in a learning to teach context.

Yin (2009) identifies three types of case studies: 1, as exploratory (as a pilot to other studies or research questions); 2, descriptive (providing narrative accounts); and 3, explanatory (testing theories). My research has elements of the first two types: exploratory and descriptive. The initial case study of a mentor and ST was exploratory and uncovered what was possible in terms of access and data collection, and allowed a refinement of the main study interviews. The subsequent three case studies allowed further description and provided narrative accounts of the possibilities for TK and ST learning.

The design of my case study approach involved considering the different philosophies underpinning different types of case study methodology. Literature reveals that case study can be used, by researchers, in different ways and for different purposes. Yin (2009) recommends a conceptual framework be used in advance of data gathering and asserts that there is objective knowledge worth pursuing through case study. Propositions, based on *a priori* theories, can be used in order to set research hypotheses which can be tested through replicable methods (*ibid.*). In contrast to these assumptions, Stake (1995, 2000) asserts that case study is a more naturalistic, inductive method with no need for *a priori* theories or hypotheses to be identified at the start of research. In this latter perspective, the purpose of case study is to understand events and view

people's actions through an interpretive lens; to embrace emerging ideas and the subjectivity of human experience.

These contrasting notions of case study draw upon the wider philosophical positions of positivism [an epistemological position which encourages the use of methods from the natural sciences to study social contexts (Bryman, 2008)]; and constructivism [an ontological position, which asserts that people construct their own understandings and versions of the world through experiencing things and reflecting on those experiences].

A more positivist (specifically, postpositivist) approach to case study (see for example Yin, 2009) adopts the need for a clear account of what is being searched for; and methods which allow for reliable empirical testing with the ability for confirmation and falsification (*ibid.*). Within this approach, steps to reduce or remove researcher influence and bias throughout the process are deemed possible (Boblin *et al.* 2013). Results are more likely to be presented in a measurable form and conclusions posed as objective truths (Cohen *et al.* 2011).

An alternative to this approach is a constructivist one. A constructivist approach to case study (see for example Stake, 2000) has less imposed structure from the outset and can be inductive; generating rather than testing theory. It is the particularities rather than the similarities (Stake, 1995) which constructivist case study finds useful; including the significance and meaning which people attach to their actions. A constructivist case study is idiographic in nature and does not seek to find general laws, instead an understanding of the unique (Kirke and Milller, 1986).

The above summaries of contrasting philosophies (Yin, 2009 and Stake, 1995) underpinning case study research are fairly dichotomous. However, these sit amongst a

diverse range of approaches which offer a multitude of different philosophical bases, each with consequential implications for case study design. For example, Eisenhardt's (1989) case study approach combines an inductive approach but with some structure at the early stages (e.g. the selection of cases prior to any fieldwork).

Another consideration in my research was the unit of study, or the case under investigation. Stake (2006: 1) sees the bounded nature of case study as important and points to a case as, 'a noun, a thing, an entity; it is seldom a verb, a participle, a functioning. Schools may be our cases—real things that are easy to visualize'. Yin (2014), however, sees case study as a research process where it is difficult to separate phenomena from their contexts and, so, is not as focused on defining the edges of the case under study. Miles *et al.* (2014:28) accord with Stake's (2006) views and see a case as 'a phenomenon of some sort occurring in a bounded context'. In my research a bounded context was identified and consisted of colleagues within a group of partner schools all involved in the same PGCE programme.

Added to considerations regarding the case study approach, there was convincing literature in favour of having multiple cases within the study design (i.e. having more than one case under investigation). Selecting multiple cases within the context may be an added strength in that 'having two case studies... is more than worth having double the amount of data on a single case study' (Campbell cited in Cohen, 2011: 291). Undertaking more than one case study as part of a research project can also allow comparison to be made across cases (Crowe *et al.* 2011), which is a form of triangulation; increasing the validity of findings and any analytical concepts drawn from the data (Stake, 2006).

With four cases selected for my study it was important to gather and maintain sufficient contextual details to allow for the findings to be presented as part of a whole. My

research was intended to be exploratory and descriptive; looking into the particularities of interaction. A case study approach which reduced data to a quantitative form was not required. The inappropriateness of using case study to produce measurable results has been discussed by Stake (1995) with statistical procedures potentially leading to 'improper generalizations' being made. An idiographic approach recognises that knowledge is individually developed in small, local settings with the specifics of particular cases seen as important (Punch & Oancea 2014).

3.3.2. The selected cases

My research included four cases, all of which were taken from a cohort of geography PGCE STs and their accompanying school-based mentors. All of the participants were teaching in co-educational, comprehensive, government funded schools in England, responsible for KS3 – KS5 humanities teaching. Further details of the research participants involved can be seen in section 3.5.

The names (all pseudonyms to ensure confidentiality) given to the case study participants are:

Initial study:

- Will (ST) and Claire (mentor)

Main study:

- Rebecca (ST) and Stacey (mentor)
- Laura (ST) and Stephen (mentor)
- Adam (ST) and Stephen (Stephen participated twice)

3.4. Data and data collecting tools

This section provides details of the tools used to collect data at different stages of the research. For a chronological timeline of data collection please see Appendix C. The initial study will be outlined first followed by the main study, including details about how lessons from the initial study influenced the design of the main study.

My aim was to find out what STs and mentors think about TK in the learning to teach process and to explore how STs can access the tacitly held knowledge of their mentors.

The data required were ST and mentor views and opinions on the role of TK, and information on the ways STs can access the TK of their mentors. The best way to achieve this was to capture authentic conversations (via interviews) which could take place within regular school practice.

3.4.1. Initial study

i. Focus group

Firstly, a focus group discussion was used to elicit the views of STs on issues surrounding TK and learning from experienced teachers. A focus group was used as it was a reasonably quick and practically straight forward way of gaining access to several people's viewpoints on a particular set of questions or issues. Participants were encouraged to develop their own ideas in response to other participants' contributions and this resulted in an informative and detailed discussion (Wilkinson and Birmingham, 2003). A focus group discussion was also chosen as it is identified as useful in gathering qualitative data quickly and helps to develop themes and schedules for subsequent data collection

(Robson, 2002). This latter point is particularly important and a main reason for carrying out a focus group early on in the initial study. The focus group discussion gathered views from five self-selected STs. The self-selection of participants throughout my research is discussed further in section 3.4. The semi-structured questioning was based upon the following lines of enquiry:

- ST understanding of tacit teaching knowledge
- If and how tacit teaching knowledge plays a role in STs' school based practice
- What are the ways STs are currently learning from their mentors
- What are the possibilities for STs to observe experienced teachers and discuss the teaching afterwards.

The focus group took place in the morning before a PGCE teaching session in a usual seminar room in order to fit in with the STs' usual schedule. I took on the role of facilitator and recorded the discussion. The participants seemed very relaxed and willing to talk (personal observation). No one person dominated, which is a potential weakness (Krueger, 1998) and all had time to share their ideas. The participants let each other take turns to speak as an informal clockwise rotation was established. Transcribing the conversation was straight forward as there were five participants and their voices were easily recognisable.

The focus group was semi-structured in nature in order to maintain a relevant discourse whilst allowing STs own perceptions and views to dominate. There was a clear agenda for discussion (focussed on the lines of enquiry, above) which aimed to ascertain what the STs understood by the term 'tacit knowledge' and if/how this featured in discussions with their mentors in school. I was flexible with the direction of the discussion as this allowed participants' views to emerge without being stifled by the facilitator (Newby, 2010). As

facilitator, I was aiming to encourage conversation without pre-determining what the answers might be (Fontana and Frey, 1994). At this early stage of the initial study any information on the conceptualisation STs had regarding TK was useful in determining the next steps in the research process. A focus group had the benefit of allowing group conversation, which encouraged data and insights otherwise less accessible without the group interaction (Oancea and Punch, 2014). The STs could offer tentative insights and thoughts which were then built upon by others.

The practicalities of holding a focus group were also useful. Five participants were involved and their views were simultaneously gathered, recorded and transcribed. The data produced was inexpensive, data-rich, stimulating and elaborative (*ibid.*., 186). The focus group discussion supported the planning of the subsequent initial study interview design.

ii. Stimulated recall (STR) interview

This section outlines the first STR interview which was carried out as part of case study one. The participants were: Will (ST) and his mentor (Claire).

In order to gather further information about the possibilities for STs to access TK an interview was carried out by Will in his own school setting. After Will had observed Claire teaching, the interview was held. Its purpose was to reveal the tacit teaching knowledge which had been used, by Claire, during the observed teaching episode.

The design of the interview was influenced by Ethel and McMeniman's (2000) study and Bloom's (1953) research into stimulated recall. Bertone *et al.* (2006:247) have also used stimulated recall and highlight this as a 'format [which] can be used retrospectively to

construct an interpretation of already performed actions to make them intelligible'. The purpose of the STR interview was to see if STs could make their mentors' actions more intelligible.

The term 'cognitive apprenticeship' (Ethel and McMeniman, 2000: 90) is an intervention (previously discussed in Chapter 2), which can be used in order to 'access the minds, not only the observable behaviours, of effective teachers' (*ibid.*: 87). The concept of accessing the minds of teachers relates very closely to the aims of my research. The intervention, used by Ethel and McMeniman, had successful outcomes in terms of allowing the TK of an expert teacher to become more explicitly available to those STs involved. A quote from their research findings highlights how useful the STs considered the process:

> *'It's like peeling away layers and a light goes on in my head when he says something and it makes sense, I understand that's why he did that. I didn't get that from just watching his teaching'* (*ibid.*: 93).

The extended quotations which are presented by Ethel and McMeniman suggest the cognitive apprenticeship method was effective at unlocking teachers' knowledge in action. Mentors are said to be often 'unaware of the knowledge they have developed through the years and, as a consequence, it is hard for them to put this knowledge into words' (Zanting *et al.,* 1998: 17). In Ethel and McMeniman's (2000) research, identification of specific lesson events encouraged the mentor to 'open up' and talk in detail about the selected events in a way which unpacked the knowledge in action at the time of use. Encouraged by Ethel and McMeniman's (*ibid.)* findings I designed my initial study interview to involve the observation and interview of an experienced teacher. This was in order to allow shared pedagogical moments to be verbally explored further.

Whilst sharing a similar format to Ethel and McMeniman's (*ibid.*) cognitive apprenticeship intervention, including STs observing an experienced teacher, the STR interview followed within my research is different in the following ways:

- The ST was physically present in the classroom during the observed lesson
- The ST recorded pedagogical moments on paper in order to explore these later
- The ST took on the role of interviewer

In order to facilitate and direct the initial study STR interview, Will took notes on the observable behaviours of Claire's teaching whilst he was in the lesson. This supported Will in formulating some possible interview questions; looking to uncover why certain teaching actions, judgements and decisions were being made. After the lesson, Claire was interviewed and asked to elaborate on her thinking regarding those incidents/decisions she had made during the teaching.

For the initial study, semi-structured interviewing was chosen as this allowed Claire's views to come to the fore (Bogdan and Biklen, 1992). Claire was allowed to freely communicate her ideas in response to several guiding questions posed by Will (the interviewer). Drawing upon an 'interview guide approach' (Cohen *et al.* 2011:413), which shares characteristics with semi-structured interviews, there were no questions provided which had to be asked by Will. I outlined the aim of the interview to Will and Claire as follows: 'uncovering the reasoning behind Claire's teaching actions'. Semi-structured interviews allowed data to be situational and to draw upon the context of the observed lesson. The context and specifics of the observed lesson needed to be the primary foci for discussion and therefore could not be pre-determined.

Guidance on semi-structured interviews within a qualitative research paradigm influenced the design of the interview, notably the content and purpose of the questioning (Kvale and Brinkmann, 2009: 31). As pre-formulated questions which follow predetermined categories are 'likely to be closed to new phenomena and may not access the interviewee's own life world', Will was given freedom to express his own questions in response to the teaching he had observed. This enabled him to ask questions that both explored his topic and fitted the interviewee's (Claire's) experience (Charmaz, 2006). Will was asked to keep the questioning related to uncovering the reasoning behind Claire's teaching actions, but the exact nature of the questions and the pedagogical incidents referred to were decided by Will.

The initial study STR interview was successfully carried out and recorded onto a USB recordable device. The interview was transcribed and has been included along with the main study data as this strengthened the small sample. The success of the initial study provided significant encouragement for further case study research using STR interviewing.

3.4.2. Main study

Three further case studies were set up and investigated as part of the main study. The details of the research participants involved can be seen in section 3.4. Each case study involved one STR interview similar to that carried out as part of the initial study. The main study also involved data collection via questionnaire in order to collect views on TK from a wider population of STs and mentors.

i. Further stimulated recall interviews

After a very successful and revealing initial study interview, which highlighted the potential for elucidating TK within a mentor-ST discussion, I decided to use this type of data collection tool for the main study. Three case studies involving five additional case study participants carried out further STR interviews.

A main advantage of the STR interviewing method, and one reason why it was my main data source, was the autonomous nature of the interviews (i.e. only the ST and mentor were involved). This encouraged a naturalistic setting and the recording of reality, revealing the inter-subjectivity between people (Bryman, 2006). The initial study had also shown that Will was successful in explicating Claire's TK, getting her to explain and justify specific elements of teaching in detail.

Interviewing in educational research is highlighted as a key data collection instrument (Aubusson, Ewing and Hoban, 2012) and was appropriate for use in my research as it allowed the spontaneous development of ideas, with meaning and significance able to come through (Seidman, 2013). The interviews enabled two things: one, the ST was able to decide what questions were important to ask, in order to access underlying teaching knowledge (exploratory questioning) and two, the mentor was able to think aloud; verbally expressing what had been driving his/her teaching actions. Another factor in choosing interviews for the main study was the opportunity for mentors to clarify the meaning of ST questions, subsequently providing more meaningful answers (Cohen *et al.,* 2011).

Interviews were a good way of accessing understanding, building a picture of each individual's perspective as the pair 'grasp for meaning together' (Forsey 2012:372). The

interviews provided an additional type of information to that provided from written answers (also later obtained through questionnaire) and were a verbal form of communication allowing free flowing ideas to emerge, be refined and clarified.

My research aimed to encourage mentors to reveal their tacitly held teaching knowledge and interviews allowed the subjects to 'convey to others their situation from their own perspective and in their own words' (Kvale 2007: 11). The research questions which revolve around STs and mentors meant it was therefore logical to have these two key people together discussing TK.

In order to help design the interviews I used Kvale and Brinkmann's (2009: 99) ideas on the 'seven stages of interview' as this provided a useful framework to follow; highlighting the importance of considering the purpose of the interview as well as the practicalities. Thematising was the first stage which included clarifying the 'what' and 'why' of the interview, helping to secure the intended knowledge (see Table 3.1). The 'how' part of the interview was then able to be decided. Only the first two stages of Kvale and Brinkmann's (*ibid.)* 'seven stages of interview' were used, as having the ST as interviewer meant that the remaining stages (three to seven) were not as suitable for my research and so have not been followed.

What...	**Why...**
• ..will STs ask mentors if they are given the autonomy to question? • ..response will mentors have to being interviewed? • ...is the likelihood that TK will be elicited through conversation between ST and mentor?	• ..might TK be important to focus on after a lesson observation? • ...are STs asked to observe experienced teachers? • ...is lesson de-brief so often dominated by mentors? (researcher's a priori assumption)

Table 3.1. Thematising the interview prior to its design.

The 'what' and 'why' questions helped to define the purpose of the interview and this subsequently supported the design of the interview. For example, it was important that STs were able to design their own questions and so an exploratory and semi-structured format was used. No exhaustive list of questions was issued; however, the purpose of the interview was clarified for each participating pair. This was to ensure the interview was driven by the relevant research questions but at the same time allowing the stories of the ST and mentor to be expressed (Rabionet, 2011). Accessing the TK of the mentor was the main focus and so having little imposed interview structure was important in order to understand more fully the complex behaviour, without imposing any 'a priori categorisation that may limit the field of inquiry' (Fontana and Frey 1994:366).

The opportunity for interviewers to make 'on-the-spot decisions' (*ibid.*: 100) was important in allowing the participants to reveal an authentic dialogue. It was important the interview objective was clear (i.e. the ST seeking to uncover mentor's TK) but the content of questioning was left to the ST as they would be in the best place to decide what was relevant (in relation to the observed teaching).

The STR interview encouraged a learning conversation, based around a shared teaching experience, which placed the STs in a position of observer seeking to explicate TK. It has been shown that TK can be accessed via elucidating questioning (Eraut, 2000) and is deemed possible. The positioning of the ST as observer and then interviewer was a purposeful methodological choice. This choice was made so as to place the ST in the role of investigator, seeker of knowledge, as opposed to receiver of judgement as can be often the case in ST-mentor conversations, post teaching (Crasborn *et al.,* 2011). Research on what constitutes effective mentoring (Sandford and Hopper, 2000; Burn, 2007; Hobson, 2009; Parker-Katz and Bay, 2008; Hudson, 2012) and the importance of self-efficacy of STs

(Wilson and Demetriou, 2007; Brown, 2009; Buitink, 2009; Crasborn *et al*., 2011) was used to design the interview process encouraging agency and purpose for the ST. This resulted in the ST taking on the role as interviewer, which was important in them developing a vested interest in the process. At the same time it gave mentors an opportunity to respond to ST questions regarding TK without the need for judgemental feedback on ST teaching.

Using stage two (designing) of Kvale and Brinkmann's (2009) interview process involved working out the logistics of how to gain the intended data. In my research it was crucial to consider how to prepare the participants beforehand as I was not going to be present during the interview. Other considerations for the interviews included organising audio equipment, considering location and ensuring ethical integrity. Research decisions on these considerations are detailed below:

- Interview preparation – the interview was exploratory in nature and took a semi-structured approach. Participants received an information sheet (Appendix I) and I spoke to each participant beforehand to explain the purpose of the observation and interview. The purpose of the interview outlined to all interview participants was stated as: 'to uncover the teacher's reasoning behind their actions'. There were suggested questions offered to the STs, such as: 'why did you do *X*?' and 'what was your reason for saying *Y*?' which were intended to clarify the purpose of the interview. The STs were asked to make notes on specific episodes or events during the lesson in order to focus their interview questions afterwards.
- Organising audio equipment. An audio recorder USB was used. This was portable and easy to transfer to the participants. The STs were responsible for the recording procedure.

- Considering location. A naturalistic setting in which participants would normally have conversations about teaching was important in order to make them feel comfortable and at ease. The interviews took place either in the classroom where the lesson had been held or in a vacant subject team room. In all cases participants were given the choice as to where they would hold their interview.
- Ethics.
    - The ethical considerations of my research are outlined fully in section 3.6. For the interviews the requirement to participate was on a fully self-selected basis. Self-selection of participants is discussed in section 3.4.

In terms of design, the interviews remained largely similar in nature to the initial study. This was because the initial study interview procedure had worked well and showed promising results in allowing Will to access Claire's tacit teaching knowledge. Small changes were made in the preparation of the STs for the main study interviews as a result of the initial study. These changes are described below:

- The STs were given further guidance on the purpose of the interview and the possible procedure to follow. This included the suggestion of noting down approximately five incidents during the pre-interview teaching which could then be discussed. This was to avoid a more generalised discussion of 'what happened next' [in the lesson] and to concentrate upon key features/episodes of the mentor's teaching.
- A basic lesson observation sheet was designed for use by the STs as a way to note down the classroom incidents and to help construct questions for use during the interview. See Appendix G for the observation sheet.

- The STs were asked to complete the interview within two days of the teaching observation to increase the accuracy of the mentor's recall (Bloom, 1953). This was a result of Bloom's (1953:162) stimulated recall suggestion that accuracy is 'at its highest (95%), if the interview occurs within two days'. The interviews were subsequently all held on the same day as the lesson observation.

Interview four was held in a different manner to that of interview one, two and three due to the post lesson discussion failing to record. Instead, I held an interview with Rebecca (ST). This interview gleaned the main points from the discussion which Rebecca and Stacey had held during their post-lesson interview (which failed to record). Therefore, interview four reveals information about the content of the discussion previously held between Rebecca (ST) and Stacey (mentor). Interview four also reveals what Rebecca had learned from the experience, as she recalls, in her own words, understanding from a previously held conversation.

ii. Questionnaires

As part of the main study, questionnaires were sent to a population of STs (n=22) and their school based mentors (n=18). These questionnaires (one designed for mentors, the other for STs) were used in order to obtain a greater understanding about how a wider population perceived the definition, importance and use of TK in the learning to teach process. The questionnaires were sent via an e-mailed SurveyMonkey link and the questions can be seen in Appendix E. They were sent out early in research year two and provide a larger source of information to add to that collected through the focus group and case studies.

Questions were designed to be short and neither ambiguous or leading. They did not require pre-requisite knowledge and unnecessarily complex words were avoided. Where closed questions were asked there was a balance of Likert responses provided to avoid responses which would be favoured as either negative or positive (Bryman, 2008).

Questions were piloted with a small group of STs prior to sending out to the larger cohort and this was informal in nature. Four STs volunteered to read the questions through and this identified changes which were subsequently made. The original question list was deemed too long and so fewer questions were used as time constraints for participants were highlighted as an issue. A suggestion of having separate questions for STs and mentors, which allowed slightly different wording, resulted in a more tailored set of questions for the two populations (STs and mentors).

The questionnaire was designed to investigate the role of TK in ST learning. The questions gathered individual definitions of TK and information regarding if and how STs and mentors considered this type of knowledge in the learning to teach process.

Questionnaire data provided evidence of how different participants view the 'object' of study – TK. Individual understanding of the object of study is one of the factors which can influence the nature of interactions between people (Cole, 1996; Edwards, 2011). The individually owned understanding of TK, which mentors and STs bring to a situation, has an effect on interactions which occur and the 'tools' that are used, whether that be physical resources or language. For my research, participants' views of TK were important when answering my key research questions (particularly the first question) as there may be individually owned understandings of the role TK plays in ST learning.

Vygotsky's work into human learning and the importance of culture and language on the learning process provided further justification for the questionnaire. The learning process is shaped by what we already know (Vygotsky, 1978) and therefore it was worthwhile to find out prior understanding of TK amongst STs and mentors. For example, if questionnaires revealed a lack of importance given to the role and use of TK in the learning to teach process, it would be logical to assume that TK would not feature, in any explicit sense, in learning conversations between mentors and STs.

The questionnaires included a definition of TK (my own) at the start in order to provide a baseline starting point for participant understanding. The potential weakness of a questionnaire which does not provide any starting point for a definition is that participants may misunderstand the term (Cohen *et al.* 2011) and, here, interpret TK as something very different to how it is understood in my research. This may invalidate the subsequent data. It was important to avoid ambiguity (Bryman, 2008) and as the focus group data revealed that STs were very unsure about the meaning of TK an initial definition at the start of the questionnaires was used.

The questionnaire was largely closed in nature and used a Likert scale for responses, later encompassing more open questions to allow for more detailed comment. A Likert scale was used as it is able to cover a wide range of responses and is more likely to gain a higher number of respondents. A Likert scale also allows responses to be grouped and therefore to reveal trends and areas of agreement. Single sentences were used, response categories were kept simple and all questions were directly attributable to the research questions (Cohen *et al.*, 2011). In order to allow for more personalised and unplanned responses open questions were also included. For example, STs were asked: '*What reveals the most to you in terms of WHY teachers act, respond, plan or teach in the way*

that they do?,' allowing individuals to explain ideas in their own words, often revealing the 'salience of issues' for respondents (Bryman, 2008: 232).

3.5. Research participants

Details of the case study participants used in the research are in Table 3.2. below. There were seven case study participants in total. The first two (Will and Claire) were from the initial study.

	Name, (age) and subjects taught	Type of school	Years of teaching (mentoring) experience
Case study 1 Mentor 1	Claire (30) Geography	Maintained Comprehensive 11-18	6 (5)
Case study 1 ST 1	Will (24) Geography	Maintained Comprehensive 11-18	PGCE
Case study 2 Mentor 2	Stephen (33) Humanities	Maintained Comprehensive 11-18	5 (3)
Case study 2 ST 2	Adam (27) Humanities	Maintained Comprehensive 11-18	PGCE
Case study 3 Mentor 3	Stephen (33) (participated twice) Humanities	Maintained Comprehensive 11-18	5 (3)
Case study 3 ST 3	Laura (23) Humanities	Maintained Comprehensive 11-18	PGCE
Case study 4 Mentor 4	Stacey (40) Humanities	Maintained Comprehensive 11-18	10 (6)
Case study 4 ST 4	Rebecca (23) Humanities	Maintained Comprehensive 11-18	PGCE

Table 3.2. Details of research participants

The whole population of STs (n=22) and mentors (n=18) on the geography PGCE course could not be included for logistical and resource reasons. I therefore decided to take a sample and had to consider how this could be made equitable to the whole population of STs and mentors, and also manageable from a research point of view.

Participants were self-selected from a population of STs and mentors all of whom were fully briefed about the purpose and process of the research. Within the population of potential participants there was likely to be those who did not want to take part (for various reasons) and this was a natural way to reduce the number of potential participants. There was also a small group of STs who were not suited to take part in a research project. I took steps to ensure the involvement of participants was both responsible and appropriate for the research aims (see section 3.7 for further details of the ethical considerations regarding participants).

After presenting an outline of my research project at a meeting attended by all STs and mentors, an invitation to participate in the research was given out. As a result of this I had several people showing verbal interest. After providing more formal written details of the involvement required (see Appendix I), I had three STs and two mentors who were fully in agreement with taking part in the research. There needed to be agreed participation from an ST and their corresponding mentor. One of the participating mentors (pseudonym: Stephen) agreed to be observed and interviewed twice (by different participating STs, both working in the same school). A similar approach was taken for enlisting participants for the first case study; and as a result one ST and one mentor participated in the initial study. In total my research included 7 case study participants.

Using self-selected participants from within a convenient population is often used in small scale, case study research and can provide access to real lives and real contexts in a good amount of detail. Convenience sampling was used as the informants and cases were close by, relevant and available (Punch and Oancea 2014). This sampling method cannot provide generalizability across a whole population of STs and mentors, and it is important to note that the case studies described in my research represent only themselves. Sampling of this kind can provide ideas for further research and can be linked with existing research (Bryman 2008).

An identifiable strength in the resultant selection is that the participants who took part could all be classed as representative of a typical ST/mentor from the PGCE course in the following ways:

- The mentors involved all had geography degrees
- The mentors were working in state funded, 11-18 comprehensive schools
- The mentors had been mentoring between 2-5 years
- The STs involved had started on the PGCE within 0-2 years since completion of an undergraduate course
- None of the STs were failing any aspect of the PGCE
- There were no reported working relationship problems between mentor and ST

These selected characteristics are replicated in the majority of the mentors and STs on the course. The 'normality' of the resultant sample increases the credibility of my findings and reduces the likelihood that the results can be deemed anomalous or invalid. However, this does not indicate the research data arising from the participants are representative of STs and mentors as a whole.

Therefore, the participants were willing and engaged individuals who were relevant to the research questions, offering their own contexts to explore the possibilities of accessing TK within a mentor-ST relationship.

3.6. Validity and reliability

There are no 'infallible decision-making rules for establishing validity' (Miles and Huberman, 1994: 263) and there are lots of different types of validity identified, twelve by Cohen *et al.* (2011) alone. Validity, as seen by Burgess *et al.* (2006: 62), involves considering whether or not 'you measure or describe what you set out to measure or describe'. Each data collection tool in my research has been designed to probe into the role of TK and how it can be made accessible to STs.

Taking Burgess *et al's* (2006) indicator of validity, above, my research ensured appropriate measurement in the following ways:

- Case study participants were all self-selected from a cohort of STs and mentors on a university-based PGCE, working in government funded secondary schools in England. This allows me to investigate opinions from a relevant population.
- The presence and influence of outsiders were kept to a minimum, with naturalistic settings and conversations being of paramount importance. Lesson debriefing is usually held between two people (ST and mentor) and this was maintained. I (as researcher) was not present during the interviews as this would have influenced the conversations and created a potentially artificial atmosphere. Interview four had to be carried out differently (see section 3.8.1) and I had to facilitate this. In each case, including the initial study, the participants chose their own time and setting for the

interview. This was to allow participants to choose a time which they felt best suited their schedule and increased the likelihood that conversations would be authentic and meaningful.

- The purpose of the observation and interview procedure was made clear and participants had opportunity to ask questions to reduce possible confusion. This increased the likelihood that participants would follow the procedure and therefore, I would be able to measure the ways in which TK had been accessed and the factors which allowed STs to develop their understanding of TK for teaching use.
- The interviews were semi-structured which allowed STs the freedom to choose and initiate their own questions related to the observed teaching and TK. This increased the likelihood that the interviews reflect conversations which are relevant and context specific.
- The interviews were audio recorded, fully transcribed and the transcripts produced are reliable accounts of the conversations held.
- The STR interviewing process was an appropriate data collection tool which allowed STs to directly question their mentors about the TK they had used in recent teaching.

Yin (2009) considers various ways in which case study validity can be enhanced including the importance of proving a chain of evidence so an external researcher can trace the steps taken through the case study. In my research, details of case study participants are provided (see page 80), a chronology of data collection is provided in Appendix C and the design and sequencing of the research process, from the initial study through to the main study, are described and justified throughout Chapter Three.

A main strength of the method followed is that the case study interviews were designed to increase the likelihood that valid data would be collected. The purposeful decision not

to facilitate the interviews myself strengthens the data as the potential for me to influence and manipulate the interview (in line with a priori ideas, identified on page 57) was removed from the interview process itself (Seidman, 2013).

The questionnaires investigated how both STs and mentors understood TK within the learning to teach process. These questionnaires gathered different definitions of TK and asked about the importance of TK in teaching and in learning to teach. The response rate was low with six STs (from 22) and nine mentors (from 18). The small numbers mean that reliability of these results is weak and not statistically significant; however, there were many responses to open ended questions and these can provide useful qualitative information. The Likert responses from the questionnaires have been included to provide an indication of ST and mentor opinion; however, it is recognised that reliability of these figures is low.

Lincoln and Guba (1985: 332) substitute 'credibility' and 'confirmability' for the notion of validity. Credibility (replacing the concept of internal validity) refers to whether or not the explanation of a particular event or issue can actually be sustained by the data; and confirmability (replacing the quantitative concept of objectivity) looks to establish how far research claims can be corroborated by others. In my research extensive quotations have been used throughout Chapters Four and Five in order to illustrate points directly with data collected. Transcripts from the focus group and four interviews held (Appendices C and E) provide evidence to enable others to corroborate claims being made. Further structural corroboration (Lincoln and Guba, 1985) is achieved with triangulation (discussed further in section 3.6.1, below) which takes the form of multiple measurements of the same phenomena. Where structural corroboration shows there is correspondence across data sets this provides increased confirmability.

3.6.1. Triangulation

Three data collection tools brought different ideas together from STs and mentors via different mediums (written, one-to-one discussion and group conversation). Interviews, as a source of information on their own, may be vulnerable to bias possibly providing a distorted picture of the understanding of and opportunities for TK in ST learning. 'Research methods act as filters through which the environment is selectively experienced [and] they are never atheoretical or neutral' (Cohen *et al.*, 2011: 195). In order to increase confidence in the findings from the interviews, the focus group and questionnaires provide additional data showing how TK is understood and used within a learning to teach setting.

My research used methodological triangulation which involved using different data collection methods on the same object of study. Where different methods of data collection produce comparable results, researcher confidence can be increased (Cohen *et al.*,2011). In my research, comparison and contrast of information gained through different sources supported the thematic analysis of data and allowed an element of iterative checking. Where multiple sources of data revealed comparable or linked findings this was helpful in considering and arriving at conceptual conclusions.

The case study information provided interview dialogue which revealed the potential and possibilities for uncovering TK within a ST-mentor relationship. Adding to this, the questionnaires provided data on the perceptions from a wider population of mentors and STs on the definitions and role of TK in teaching, and in learning to teach. Both questionnaire and focus group data added to the interviews in order to build a stronger, more valid picture of how TK is seen and utilised by STs and mentors.

3.6.2. My role as researcher

This section considers my role as researcher, in particular my role as an insider researcher, and the reflexive approach I took to the research process.

Recognition of my own views and influence on the participants, and resulting research findings, are essential to providing an account that can be seen, and therefore judged, by others in terms of validity and trustworthiness. As Huberman states (2010:262), 'it is often the openness of cognitive structures that determines the ability to assimilate, or not, the implications of research', so emphasising the need for transparency. Personal bias, values and beliefs cannot be eradicated from research but only recognised and, if desirable, their influence reduced.

In considering the position of researcher, Hellawell (2006) puts forward an insider-outsider continuum. An insider will have contextual understanding of the people and settings being studied whereas an outsider will be unfamiliar. Hellawell's (*ibid.*) insider-outsider research continuum provides a useful heuristic for considering the level of researcher submersion. Throughout my research I had an insider position due to having a priori knowledge of the community and its members (Merton, 1972). I am outside the relationship being studied (mentor and ST) although not completely removed as I have a professional link to, and a level of responsibility for, all involved. Being an insider-researcher has enabled me to access relevant participants, to set up the interviews and to be able to understand the context from which the data have come from. It is this understanding of context which can be seen as a filter through which the data will be analysed and interpreted. It is the awareness of my position on the continuum which can encourage high levels of reflexivity in my research.

My insider role afforded me many opportunities which an outsider would not have had. For example, regular access to case study participants, visits to subject departments on school sites and a wider community of colleagues to questionnaire, to name a few. The role of insider also enabled me to perceive what questions might be useful to research. I was aware of mentors' and STs' professional concerns and I have a shared professional knowledge and experience of teaching. I have been through a teacher education programme, taught secondary school geography, mentored STs in a school context and, latterly, been a university tutor on a secondary school PGCE. This familiarity supported the design of the key research questions.

Having an insider position within the research enabled me to have enhanced rapport and communication with participants (Hockey, 1993) making the process of data gathering quicker and easier. An outsider researcher may have been able to gain similar access to teachers in school settings; however, the likelihood of finding participants willing to participate may have been reduced and the contextual understanding would have been weaker.

Researcher presence during any element of empirical data gathering can influence participants and create artificial situations. For this reason I decided that I would not be present during the interviews and the STs would take on the facilitator role, asking the questions. I made this decision due to my close professional connections with the case study participants, which I felt would influence the dynamics of a recorded interview. My dual roles of researcher and tutor may have become merged and this would have presented a potential conflict of purpose during the interviews. The potential for mentors to be overly concerned with saying the 'right' thing and for STs to be asking the 'right' questions during the interviews was reduced because I was not present.

Reflexivity, in a form defined by Bryman (2008), includes the implications of methods, values, biases and decisions within research and is crucial to achieving a high level of validity. Hellawell (2006: 488) notes a similar view of reflexivity in that 'there should be a conscious revelation of the role of beliefs and values held by researchers in the selection of research methodology for the generation of knowledge'.

Value free research, illustrated by Bryman (2008: 24) has 'the expectation, on the face of it, that social researchers should be value free and objective in their research' and was, for some, a sought after goal at one time in educational research. Durkheim (1938: 31) encouraged all 'preconceptions to be eradicated' within social research. However, later writers on educational methodology recognised the implausible challenge this positivist view presented (Hammersley, 2006, Hellawell, 2006) with Bruner (2004: 709) stating 'there is no innocent eye, nor is there one that penetrates aboriginal reality'. Indeed some research paradigms would openly require the need for values to be inherent within the design. Value laden research (Bryman, 2008) identifies the presence of values in many/all stages of the research process and feminist writers, such as Mies (1993), encourage their presence and usefulness. 'Conscious partiality' (Bryman, 2008:25) is suggested as an alternative to value free research wherein researchers aim for self-awareness and recognition of a priori beliefs. Researchers and their methodological choices may act as filters through which 'the environment is selectively experienced' (Cohen *et al.,* 2011: 195) but are never atheoretical or neutral.

Personal bias, values and beliefs cannot be eradicated from research but only recognised and, if desirable, their influence reduced. Recognition of my own views and influence on the participants and resulting findings are essential to providing a research account that can be seen, and therefore judged, by others in terms of validity and trustworthiness. As

Huberman states (2010:262): 'it is often the openness of cognitive structures that determines the ability to assimilate or not the implications of research', so emphasising the need for transparency. I have taken care to achieve this transparency over the choices and decisions taken at each stage of the research process. For example:

- Being clear about my insider role and the professional relationship I have with participants
- Being open about the need for, and limitations of, self-selected participants
- Providing details of my own a priori ideas (the ones I can recognise)
- My own working understanding of the research terms
- Providing full transcripts of all interviews held

Social researchers are 'part of the social world which they study' (Punch and Oancea, 2014:162) and therefore need to be aware of the influences, choices and bias through each stage of a research project. Being an insider-researcher enabled me to access relevant participants, to set up the interviews and to be able to understand the context from which the data have come from. It is this understanding of context which can be seen as a filter through which the data will be analysed and interpreted. It is the awareness of my position on the continuum which can encourage high levels of reflexivity in my research.

3.6.3. Generalisability

My research does not claim universal generalisability; however, case studies rich in detail, typical in nature and future orientated can be highly useful and applicable to other educational settings (Schofield, 1990). The case study interviews provided a significant

depth of dialogue so that considerations of representativeness and generalisability were replaced by 'a compelling evocation of an individual's experience' (Seidman, 2013: 55). Bassey (1981) once held that the study of single events is a more profitable form of research (judged by the criterion of usefulness to teachers) than searches for generalisations. Since 1981, Bassey has amended this view and talks of the usefulness of 'fuzzy generalisations' (2000:1) emanating out of single case empirical educational research. In my research, case study allows further understanding of the complexities of the role of and access to TK in a ST-mentor relationship and leads to fuzzy generalisation through thematic analysis (see section 3.8 for more detail). Returning to the constructionist basis upon which my research is designed, the interviews were looking for knowledge which is socially and historically contextualised rather than knowledge which is 'universal and valid for all places and times' (Kvale and Brinkmann, 2009: 261).

Empirical realism holds that an external truth is available (Bhaskar, 1989) and can be, to a greater or lesser extent, accessed by educational research. In finding this truth one could be confident that others, in similar settings facing similar issues, would want to know and use this knowledge. In my research, rather than seeking to find an external truth regarding TK with the ability to generalise across all contexts, I sought to understand the experiences of the participants at the time and in the place where the data were collected. The extent to which my research captures and conveys the individually owned truths experienced by the participants relies upon how far the participants were able to express themselves through language (spoken and written), the extent to which the research method stimulated and recorded the individual realities and how this has been eventually analysed and portrayed in conclusions towards the end of this thesis. If others can find resonance in these conclusions this can support professional engagement with

current practice on TK in ITE settings. In short, my research may not be directly transferable to other/all settings; however, the thick description (Geertz, 1973) and idiographic elucidation can support others in connecting with ideas about TK in ITE.

3.7. Ethical Issues

I sought ethical approval to undertake my research with The Open University and The University of Oxford. Two HEIs were asked as the participants were taken from a PGCE course awarded by The University of Oxford but my own EdD is awarded by The Open University. Both institutions gave ethical approval and did not require any changes to the initial proposals. The University of Oxford provided emailed approval and The Open University provided a letter of approval (see Appendix H). This approval provided confidence that my plans for selecting, informing and working with research participants were acceptable and in line with the universities' ethical guidelines. Permission to undertake the research on school premises was requested from the head teachers of the schools involved (see Appendix J) and individual participants were given information sheets and asked to sign consent forms (see Appendix I).

Having an insider position within the research has enabled me to have enhanced rapport and communication with participants (Hockey, 1993) making the process of data gathering quicker and easier. It is important from the point of view of transparency and ethical responsibility to make clear how this insider position has been used within the context of my research. Below are details of the steps that were taken to ensure the participants were fully aware of the implications of being involved and the measures taken to reduce any adverse affects of participation.

- As an insider researcher I had access to the STs and mentors in a professional capacity and sought participants out of this group. There was an overriding concern for participants to be self-selected and aware of the commitments involved. This was in order to ensure the participants were not coerced or disadvantaged with the extra workload. The selection of participants for the main study was, as with the initial study, driven by the ethical responsibility of allowing willing and interested people to volunteer rather than selecting and inviting chosen individuals. The potential disadvantages of self-selected participants (e.g. skewed or anomalous results) had to be withstood. A discussion on the validity of self-selected participants for research is to be found in section 3.5.
- Due to my insider role, I recognised there was the potential for mentors and STs to feel obliged to take part in order to seem diligent or respectful. I was careful to stress the voluntary nature of participating.
- I gave a brief presentation to all of the mentors and STs on the PGCE in order to outline my work and indicate the intended purpose of the research.
- Participant information was provided and written consent obtained.
- A small number of STs would not have been accepted as participants due to the fact they were struggling to progress on the geography PGCE therefore conversations regarding research goals and extra work (interviews) would not have been appropriate for them. These people did not offer to participate anyway removing the need to mitigate this situation.
- In preparing participants I ensured the separate nature of the research was clearly explained. Participation was in no way connected with assessment on the PGCE. It was outlined to all participants that taking part in the interviewing was to be used for research purposes only and not as part of PGCE assessment. This was of

paramount consideration in terms of ethical responsibility especially as during the time of the research I was also visiting STs and discussing observed teaching as part of their course requirements. Visits for assessment and visits regarding research were kept separate. The research demands were clearly separated and I emphasised that participation was wholly voluntary.

- Time requirements for the length of interview were also flexible for ethical reasons. It was important that the research process did not add a detrimental workload which could impact PGCE course related work. It was left to STs and mentors to decide how much time they could spare.
- Confidentiality was ensured through the use of pseudonyms for mentors, STs, pupils and schools.

Confidentiality issues were discussed and clarified with participants. Participants were told their names would be changed, they could leave the study at any time and the data they provided would be stored on a personal, encrypted USB as well as on the hard drive of a personal computer. The end result of the data was discussed, it was made clear that this was part of an EdD research project and that the results would be published and publicly available. Participants were asked for permission to record their interview and the fact that interviews were to be transcribed was clarified. No ethical problems had arisen out of the initial study STR interview procedure and this provided confidence that further main study STR interviews, carried out in a similar manner, would be responsible and appropriate.

Due to the nature of a PGCE course (i.e. potentially demanding and stressful) the participating STs were already very busy and even with controls in place, there was an ethical question of whether taking part in my research would add unduly to an already

full workload. Using the BERA guidelines (2011) for responsible research helped provide a framework for me to question my plans and to consider the impacts on participants. Evaluating my research practice from a range of perspectives was also useful. Considering duties (what is the right thing to do?), consequences (how will each course of action affect the individuals involved?) and virtues (how would a virtuous person act in this situation?) (Punch and Oancea, 2014:60) encouraged me to think outside my own personal research goals.

Hammersley (2008:756) questions the grounds upon which research is deemed ethical or not suggesting we should 'not be brow-beaten into accepting that 'ethical' means 'what is in conformity with some set of ethical rules', even less that it amounts simply to what is declared ethical by an ethics committee' and whilst the BERA guidelines provided a list of suggested considerations, I felt my own contextual understanding was crucial in foreseeing any ethical issues arising from my research plans. One of these contextual factors was my own knowledge of the participants involved and how they might be affected. As I was one of the first people in a position to see whether the research process was having detrimental effects on participants it was always possible the research tools may have had to change in response to ongoing feedback and observation. One significant change to my plans came as a result of Rebecca and Stacey not having recorded their interview and I felt it was too time consuming to ask them to run the procedure again. As a result the interview for case study four was held in a different manner, with me facilitating a shorter interview, asking Rebecca about the conversation she had held with her mentor (Stacey). I ensured Rebecca was aware she did not have to speak to me about her interview and that this was additional to the original request to

participate. Rebecca was keen to tell me about her post-lesson interview with Stacey and we arranged a convenient time after school.

My research also included ethical choices in terms of what to pursue, what to select and what to write about. Huberman (1994), Edwards (2002), Radnor (2002) and Hammersley (2008) have all written about the purpose of educational research and the influence research has on policy making and practice. It is an ethical choice as to which direction, whose issues and voices, which perspectives and audiences are chosen and catered for in any research project. I have chosen to focus upon TK and to find out more about the possibilities for this type of knowledge in a mentor–ST relationship. My own ambition for the research is for TK and ST learning to be understood more fully, for there to be greater understanding about what can be learned from school based mentors and how this learning can take place.

3.8. Data analysis framework

A qualitative approach to analysis was used involving categories (or themes) being developed that were grounded in the data. The data collected were subjected to thematic analysis and this has been useful in working through the large quantity of information gained; and for revealing salient points closely connected to the research questions. The theoretical reasoning for this choice is outlined below, followed by a step by step guide as to how thematic analysis has been utilised within my research.

3.8.1. Thematic analysis

To match the complex and rich nature of social settings and human behaviour there are a variety of qualitative analytical tools which can be employed to study them. Tesch (1990:97) names 26 different analytical techniques for use with qualitative data. Data can be looked at from different perspectives and in the case of my research it was important to be able to maintain the connection to the setting in which it originated.

Thematic analysis is a method of 'identifying, analysing and reporting patterns within data' (Braun and Clarke, 2006:79) and has been used in my research to examine data from the questionnaires, interviews and focus group discussion.

Thematic analysis has its roots in qualitative research and has similarities with other forms of qualitative analysis looking to decipher meaning, purpose and concepts. The process can take the following steps (as outlined by Braun and Clarke, 2006: 87):

1. *Familiarisation with the data:* reading and re-reading the data.
2. *Coding:* generating succinct labels that identify important features of the data relevant to answering the research questions.
3. *Searching for themes:* examining the codes and collated data to identify significant broader patterns of meaning; collating data relevant to each candidate theme.
4. *Reviewing themes:* checking the candidate themes against the dataset, to determine that they tell a convincing story that answers the research question. Themes may be refined, split, combined, or discarded.
5. *Defining and naming themes:* developing a detailed analysis of each theme; choosing an informative name for each theme.

6. *Writing up:* weaving together the analytic narrative and data extracts; contextualising the analysis in relation to existing literature.

These steps are very similar to other forms of qualitative analysis in that coding, thematising, noting patterns and making logical connections are all part of the process. Coding, being the second suggested step in thematic analysis (as above), plays an important part in grounded theory (Glaser and Strauss: 1967) and in content analysis. Both of these analytical tools have been dismissed in my research as they concentrate upon the priority of theory generation and 'systematic quantitative description' respectively (Kvale and Brinkmann, 2009:203). A high level of abstraction (reduction of data) and removal of available meaning from its contextual source does not fit with my research.

Boyatzis (1998) describes five purposes of thematic analysis: it is a means (1) of seeing, (2) of finding relationships, (3) of analyzing, (4) of systematically observing a case, and (5) of quantifying qualitative data. As an approach, thematic analysis is a tactic for reducing and managing large volumes of data without losing the context, for getting close to or immersing oneself in the data, for organizing and summarizing, and for focusing on the interpretation (Mills *et al.*, 2010).

A main feature of thematic analysis is coding, where the researcher looks for recurrent ideas and relationships throughout the textual data. There are many different ways of doing this and using a priori themes is one such way; deductively seeking to identify if interview data for example, can be coded using interview questions or theoretical constructs the researcher wishes to investigate. Thematic analysis can also be carried out inductively with themes 'emerging from and being grounded in the data' (*ibid.:* 928). This can involve data displays illustrating emerging themes and relationships between ideas;

the use of interpretive memos and an eye on recurrence and importance (Buetow, 2010). My research has aspects of both inductive and deductive approaches as my own a priori ideas were initially used to see if these preconceptions were borne out in the data. There were, however, many other interesting ideas which emerged without any prior assumption.

3.8.2. The use of thematic analysis in my research

From the beginning of data collection I started to draw conclusions about what participants were saying and where patterns were emerging. Miles and Huberman (1984:26) refer to a 'competent researcher holding these conclusions lightly', maintaining scepticism and gradually building towards more explicit and grounded conclusions (Glaser and Strauss, 1967).

Miles and Huberman (1994) provided useful methodological tactics for making sense of the data. Tactics used for generating meaning included noting patterns and similarities, making metaphors (which involved providing key terms to summarise a bulk of text: coding), making comparisons, building a logical chain of evidence (e.g. linking text/metaphors together to build the themes) and gradually developing conceptual coherence across the whole data set.

Braun and Clarke's six steps (as outlined on page 97/98) were followed. The interview and focus group transcripts were read through a number of times, in order to familiarise, and during this process annotation and memoing were used to lift ideas out of the text (see figure 3.3 on page 101); summarising a bulk of text and allowing the ideas to become more visual. Similarities and repetition became more apparent.

The annotation process established a greater sense of what information was 'carried' in the data and the next step was to pick these ideas out and find similarities where possible. In order to continue to lift and group ideas out of the text, sticky notes were then used. Key points, questions and ideas relating to the three research questions were written out on sticky notes and these were then collated together into categories – termed codes in Braun and Clarke's (2006) second stage. With various codes appearing these were then examined and organised into broader patterns of meaning (potential themes), see Figure 3.4 (page 102) for emerging themes. Cross checking of the transcripts for further data to support each of these broader themes was carried out through highlighting. The use of a coloured highlighting tool proved useful in recognising repeated or similar ideas and in gathering data for the emergent themes. For an example of thematic highlighting see Figure 3.5 (page 103). Coloured highlighting was used; however, numbers in Figure 3.5 have also been allocated to allow for black and white publication.

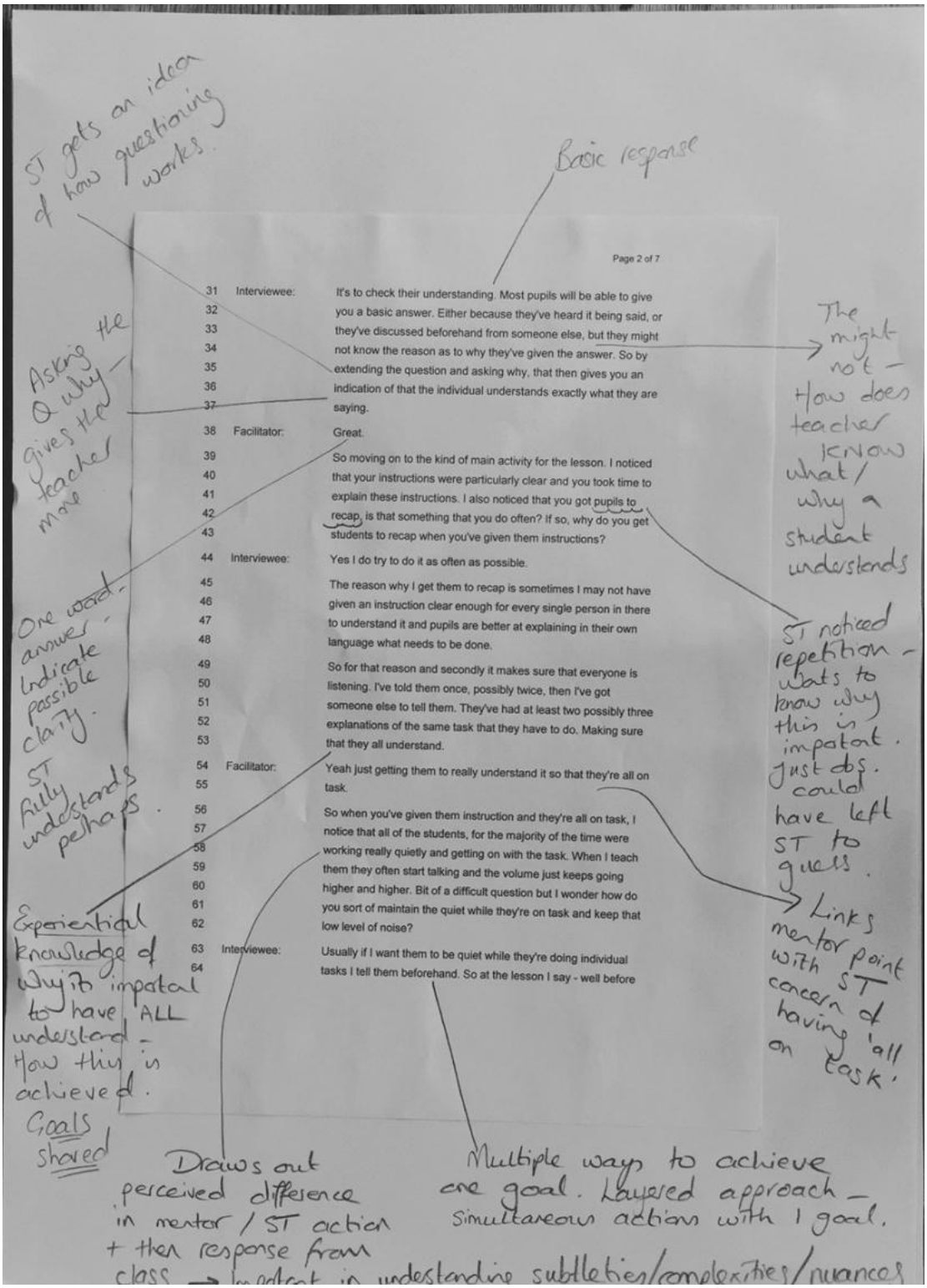


Figure 3.3. Original transcript showing first stage: familiarisation - reading and lifting ideas out of the text.

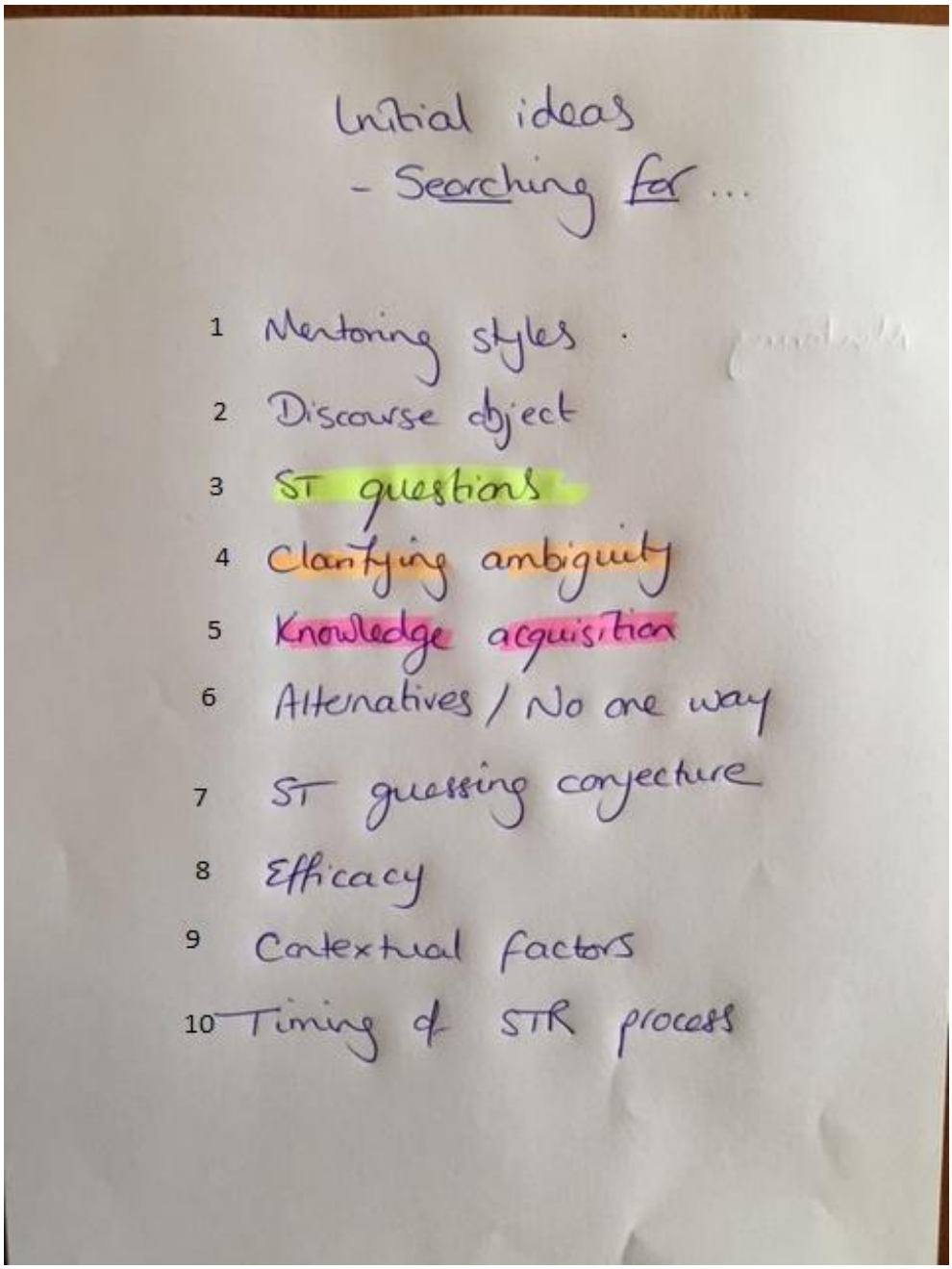


Figure 3.4. Emerging themes (numbers link to transcript in Figure 3.3.)

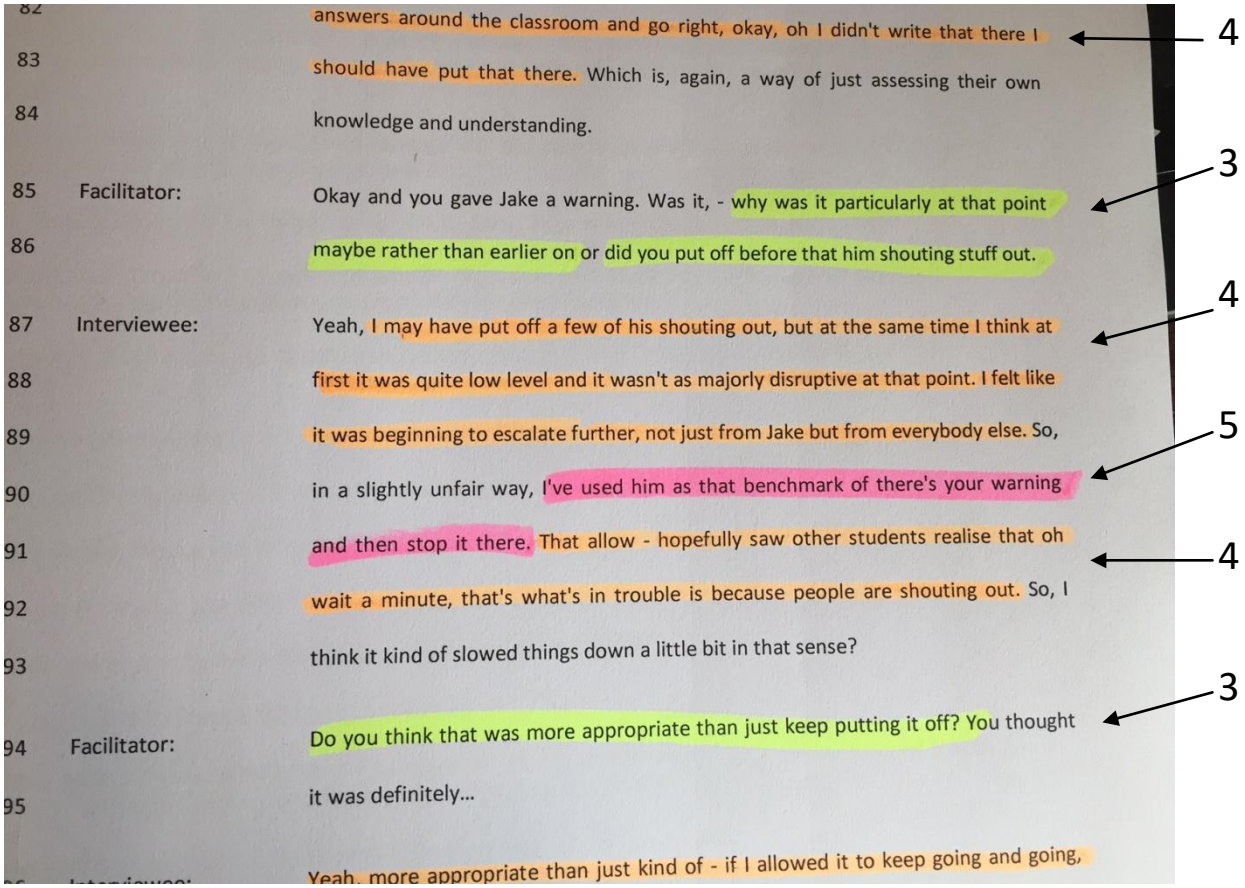


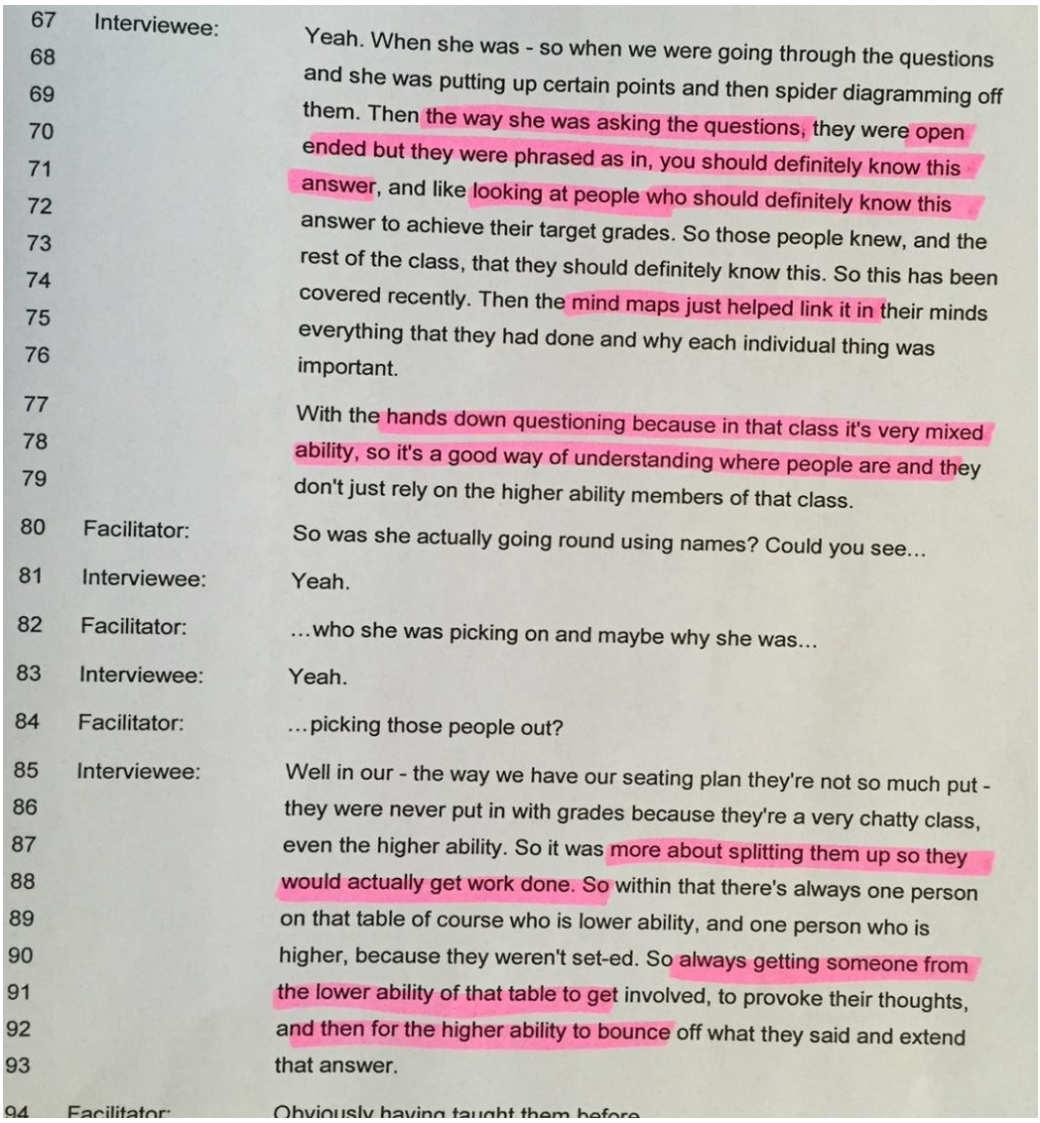
Figure 3.5. Original transcript with multiple highlighting in order to collate data according to each emergent theme. The numbering links to the list of emerging themes in Figure 3.4 on page 102.

Therefore, the themes were developed out of iterative reading and familiarisation, supported by the annotation and coding from the early stages. The guiding principles for whether or not an aspect of the transcript was deemed worthy of inclusion or consideration were:

- Relevance to the key research questions
- Repetition within or across transcripts
- Unusual or markedly significant comments relevant to the debates surrounding TK and ITE. For example, those which could be identified as a priori themes (e.g. STs able to construct and decide upon questions to elicit TK).

Thematic analysis of the focus group transcript followed a similar procedure. The transcripts were annotated, allowing ideas to emerge and then these ideas were coded according to whether conversations illustrated STs accessing TK or if the role of TK was indicated (see Figure 4.5, page 104). The focus group data were used to compare and contrast with the case study interviews.

The dialogue from interview four (Rebecca's interview) was between myself and the ST, therefore a slightly different approach was taken. The transcript for interview four was examined for the codes and then themes as previously outlined. However, as this interview revealed the nature and content of a previously held discussion, the TK which was recalled (by Rebecca) during the interview was also searched for. This was useful in highlighting what Rebecca had remembered in terms of teaching knowledge gained from her discussion with Stacey. An example of this thematic search is shown in Figure 3.6 (page 105).



67 Interviewee: Yeah. When she was - so when we were going through the questions
68 and she was putting up certain points and then spider diagramming off
69 them. Then the way she was asking the questions, they were open
70 ended but they were phrased as in, you should definitely know this
71 answer, and like looking at people who should definitely know this
72 answer to achieve their target grades. So those people knew, and the
73 rest of the class, that they should definitely know this. So this has been
74 covered recently. Then the mind maps just helped link it in their minds
75 everything that they had done and why each individual thing was
76 important.
77 With the hands down questioning because in that class it's very mixed
78 ability, so it's a good way of understanding where people are and they
79 don't just rely on the higher ability members of that class.
80 Facilitator: So was she actually going round using names? Could you see...
81 Interviewee: Yeah.
82 Facilitator: ...who she was picking on and maybe why she was...
83 Interviewee: Yeah.
84 Facilitator: ...picking those people out?
85 Interviewee: Well in our - the way we have our seating plan they're not so much put -
86 they were never put in with grades because they're a very chatty class,
87 even the higher ability. So it was more about splitting them up so they
88 would actually get work done. So within that there's always one person
89 on that table of course who is lower ability, and one person who is
90 higher, because they weren't set-ed. So always getting someone from
91 the lower ability of that table to get involved, to provoke their thoughts,
92 and then for the higher ability to bounce off what they said and extend
93 that answer.
94 Facilitator: Obviously having taught them before

Figure 3.6. Highlighting to identify TK recalled from the STR conversation between Rebecca and Stacey. Interview four.

As part of analysing the data it was important to let the participants' voices come through. As Mischler (1990: 418) states 'validity assessments are not assured by following procedures but depend on investigators judgements'. I felt it was crucial to maintain the authenticity of the language and the links (in interviews) between the questions posed and the responses gained. This resulted in a limited level of abstraction. Abstraction involves generalising and theorising out of data which can 'aid the

development of first and second order concepts' (Punch and Oancea, 2014:21). See Figure 3.7.

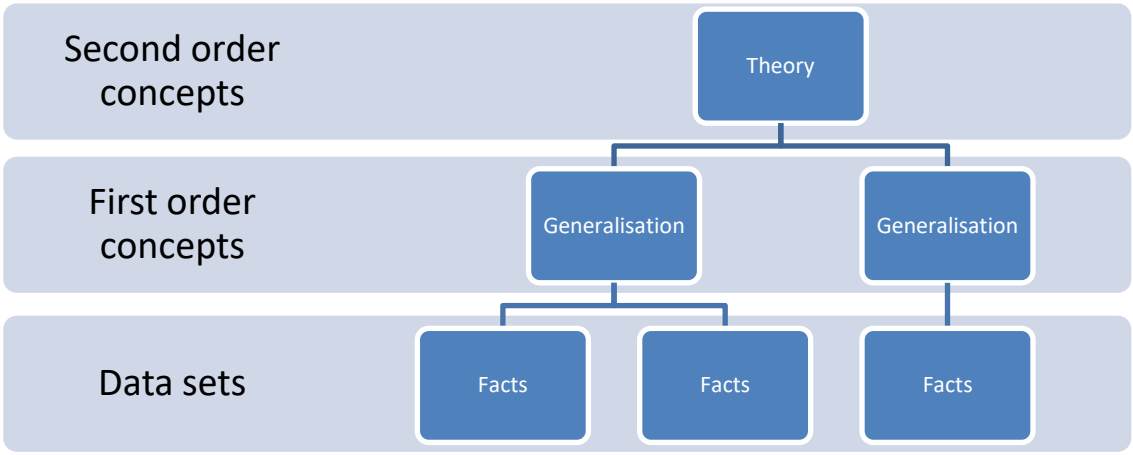


Figure 3.7. First and second order concepts.

Abstraction can lead to general, theoretical ideas which can be used to support understanding and further work. I felt that the extent of thematising was sufficient to allow for connected and aggregated ideas to emerge without reducing the data or putting the data through too many filters. This allowed the data to be reduced but not in such a way as to strip the data from its context (Punch and Oancea, 2014).

Thematic analysis of data resulted in first order concepts being identified. These first order concepts can be likened to the 'fuzzy propositions' referred to in Bassey's (2009: 85) suggested process which goes from research questions to empirical findings (see Table 3.3 on page 107). Arriving at 'fuzzy propositions' in my research came as a result of the iterative thematic coding procedure, which included the use of a highlighting tool, and can be related to procedures C and D in Table 3.3. In my research 'fuzzy propositions' were taken to mean initial ideas about what the findings might mean, what could be surmised from the data in relation to the research questions.

A	Research questions, through interviews, observations and readings etc., lead to raw data.
B	Raw data are stored in the case record as data items, each with a locatable reference.
C	Creative and reflective thinking about the data items lead to draft analytical statements.
D	The draft analytical statements are tested against the data items, and amended or discarded as necessary. C and D together are an iterative process aimed to get the most from the data.
E	When the iterative process is exhausted the analytical statements are re-expressed as empirical findings.
F	The empirical findings may lead to fuzzy propositions in a report, or to an evaluative report, or to a story or portrayal according to the type of educational case study. In each of these, sufficient data items and analytical statements will be included, with an account of the methodology, to give confidence in the report.

Table 3.3. From research questions to empirical findings (Bassey, 2009)

Analysis of data and discussion of themes, linked to the key research questions, were predominantly validated through the use of quotations as 'when presenting a thematic analysis, quotes should be a pivotal part of the narrative' (Guest *et al.*, 2012: 104). Quotes have been heavily relied upon to exemplify the themes and to construct a meaningful argument which remains transparent and contextualised for the reader; confirmability is then also increased (Lincoln and Guba, 1985). The quotes were selected on the basis of their illustrative properties and in providing detail to highlight when and how the object of study (TK) was perceived or discussed by the participants. As recommended by Guest *et al.* (2012) identification of the source of the quote has been used throughout (with specific line numbers referred to) therefore allowing the reader to delve into the appropriate transcript to seek a fuller understanding of how the quote fitted into the whole conversation.

3.9. Limitations of the research design

The way in which the research evidence was collected has influenced the findings that are presented and discussed. In order to contribute towards a reflexive research approach, what follows is an acknowledgement of the ways in which the data collection tools used within my research each have their own limitations or weaknesses.

3.9.1. Case study

Cautionary literature and advice on how case study may have weaknesses as a research approach include attacks on the lack of generalizability possible (Nisbet and Watt, 1984; Bryman, 2008) and the potential for researcher bias to be present (Merriam and Tisdell, 2015). However, there is a lack of agreement over the criticisms of case study as Schofield (1990) argues that generalisability of case study, where adequate contextualisation is provided, is possible. My research is not claiming universal generalisability or external validity outside the settings involved. Instead, it aims to uncover the potential for, and methods of, eliciting TK within three different school settings.

Case studies two and three rely upon Stephen as the participating mentor. His two partnered STs, Adam and Laura, were involved separately and carried out their observations and interviews at different times. This does mean the four case studies only included three mentors, with the number of case study participants at seven people in total, yielding four different interviews. This limits the number of perspectives gathered to seven.

Case study four was carried out in a slightly different manner as a result of Rebecca and Stacey's interview failing to record. The interview carried out and transcribed was an

interview held between Rebecca and myself; aimed at eliciting the details of the original post-lesson conversation. Whilst initially seen as a potential weakness in the case study itself this alternative interview has been identified as having strengths which are directly relevant to the aims of my research. Notably, there is evidence that Rebecca learned, and could recall, the details of Stacey's TK which she used during classroom teaching, as a result of her post-lesson conversation.

3.9.2. Questionnaire

A questionnaire was designed to reveal perceptions about the role and usefulness of TK in ITE from a wider population. The questionnaire went out to a population of 22 STs and 18 mentors. The response rate was low with six and nine responses respectively. This does limit the validity of the conclusions which can be made from these responses and does not allow for generalisation but can only show an indication of wider opinion. The information which was returned was useful for the design of the three main study interviews as ST and mentor opinion on TK was gathered.

A limitation of the Likert scale used in the questionnaires is that I decided the answer categories and one respondent's 'agree' may be another's 'strongly agree' (Cohen *et al.* 2011: 387). This limits the internal consistency of the range offered (Punch and Oancea, 2014); however, the questionnaire results do also portray the chosen terms and language used by the STs and mentors, particularly in the open questions.

3.9.3. Focus group

An identifiable weakness in using a focus group as a method of data collection is the effect of having five participants present at the same time and the tendency for conversations to diverge away from the focus/theme for discussion. During the focus group participants tended to respond to one another; picking up and developing each other's points even if not related to the original question. However, generally during the 25 minute discussion the majority of the commentary was relevant and revealing for the purposes of my research.

My own presence as facilitator will have affected the discussion. After transcribing the recording and reading through, it can be seen that I interject, finishing participants' sentences and re-phrasing their answers giving a slightly different meaning to their original answer. This had an impact on the direction of the discussion as my own re-phrased responses were picked up by others as they go on to explain things in light of my interpretation. My involvement created potential weakness in the originality and unbiased nature of all of the viewpoints and perspectives drawn out from the focus group.

It is also important to note that in addition to my role as focus group facilitator I am also an academic tutor to all of the focus group participants and this is likely to have influenced the content of the discussion. Participants in the focus group were noticeably careful to clarify their comments in an attempt to depersonalise what they had said. For example:

> *David: I'd say feedback is really good. When [I] have a disastrous lesson and go through it, what would he do differently, so yeh.*

Facilitator: Would he say what he would have done differently?

David: Not to put me down, just to say this is what you could do, what would work out better.

This example shows David not wanting to suggest that his mentor would 'put him down' and elsewhere in the focus group recording where one ST said she would not go to her mentor for help or advice but another teacher instead. Immediately after this she clarified by saying '*I'm not complaining'*, revealing possible effects of me as facilitator and insider researcher.

Even with these weaknesses acknowledged the naturalistic, informal and social setting for the focus group discussion enabled the participants to take ideas [on TK] forward in their own way. This is evidenced in the fact that the majority of the speaking was carried out by them.

This methodology section has outlined and justified the theoretical and practical decisions taken in order to gather data relevant to my research questions. The data collection tools of interviewing, focus group discussion and questionnaire have been covered along with the details of participants involved and the important ethical issues arising out of the methodology followed. The process of thematic analysis which was followed in my research has been explained and illustrated. I have outlined how my research has been designed to increase the confidence that the findings and conclusions are valid and can be considered confirmable. The next chapter presents and analyses the findings from the data collection process.

Chapter 4 Presentation and analysis of research findings

In this chapter the results of each data gathering exercise are presented and analysed to show how they relate to the key research questions and to the concepts drawn from the literature.

Findings from all four case studies are presented first as these are the largest and main source of data. The case study data involving Rebecca and Stacey are presented at the end of the case study section as there were problems with this methodology and the findings were different to those from the other three. Following the case studies, the questionnaire findings are presented culminating with the focus group data at the end of the chapter.

Full transcripts of the focus group and all interviews were made. An example of this is available in Appendix D.

As discussed in section 3.8.2, thematic analysis has been used to decipher meaning from the data. The case studies each include a scene setting introduction to contextualise the interview information.

The structure of the findings and analysis chapter follows the key research questions closely. Data are presented and analysed under the headings of:

- The role of TK
- Ways to access TK
- Factors encouraging ST access to and understanding of TK

4.1. Case studies

4.1.1. Case study one: Will (ST) and Claire (mentor)

As part of the initial study Will (ST) observed his mentor (Claire) teach a lesson and then interviewed her about the teaching afterwards.

Will (age 24) and Claire (age 30) were based in a co-educational, comprehensive school and the lesson was taught to a year seven class focussing on the location of football stadiums.

The interview took place directly after the lesson in Claire's classroom. Will had taken brief notes to use as pointers throughout the interview. Will and Claire were the only people present during the interview.

The role of tacit knowledge

Will was able to access Claire's TK which had been guiding her teaching through the observed lesson. He described features of the lesson from his own observations and asked Claire to elaborate on specific aspects, for example how Claire was setting homework. Claire's reasoning was clearly evident throughout the interview and her reasoning was linked to teaching goals, including how and why decisions had been taken at particular points.

The interview focussed around four key issues:

- Homework
- The use of lesson objectives
- Clarity of instructions
- Noise levels

Accessing TK from Claire allowed Will to develop his understanding of her teaching techniques and therefore played a role in his learning. By focussing on questions which were aimed at eliciting Claire's TK, Will uncovered links between Claire's teaching actions and her intended or actual outcomes. Will asked questions such as 'why do you...' and 'how do you get pupils to...'. Most responses from Claire involved a multi-layered set of methods and reasons. Will tried to summarise and condense answers; however, Claire would continue with explanations and reasons for actions and decisions, illustrating that methods of teaching cannot always be reduced to simple cause-effect summaries.

Claire's detailed responses reveal the complexity of knowledge and skills a teacher draws upon to make sense of, and manage, dynamic classrooms; referred to by Schön (1983:50) as 'inherent intelligent action'. This interview highlights that Will is learning about the multiple actions and choices which need to be considered when trying to achieve one goal. An example of this is in Table 4.1 which shows dialogue regarding homework. Table 4.1 highlights Claire's TK and her multiple considerations. Claire's points are condensed and the meaning indicated in bold. This is to highlight the four separate points of TK elicited as a result of Will's question.

Interview quote (lines 122-137, Appendix D)	Claire's TK indicated
Will*: I just wondered how [to] make sure that they all understand homework - because you can't go around to every pupil saying did you get the homework, have you got it written in*?	
Claire*: So you get them to take their planners out and you can do a quick scan of the classroom and see that they've all got their planners out and they're all writing in.*	**Direct instruction needed. Check the instruction has been followed**
Then give a chance of - does anyone need help writing them in? Especially year seven, I wrote it in for one of my other pupils that I teach in a different class because he has trouble writing in the instructions.	**Be prepared to support**
It's knowing your pupils really, which ones are going to find it difficult and which ones are going to write it in no problem.	**Using previous knowledge of individuals**
It is difficult because at the end you go along with the lesson and	**It is important to consider**

..you don't really want to stop just to write in the homework so you might leave it a little bit and then you realise you're out of time.	**the timing of setting homework**

Table 4.1. Dialogue between Will and Claire, illustrating TK being revealed on the issue of homework.

Claire was asked to elaborate upon the setting of homework and her response covered a range of considerations and actions, which she may not have deliberated over and explained in such detail in a normal debrief. This reflects Martin's (2007:152) comments on how experienced teachers use TK, 'the knowing is tacit, implicit in the action', and how difficult it can be (for STs) to understand teaching through observation alone. The STR interview proved useful in encouraging Will to ask questions relevant to his learning (here, homework) and resulted in Claire unpacking the issue in fine detail. This example illustrates how a focus on TK in post lesson discussion can play a role in ST learning.

Ways to access tacit knowledge

The STR interview worked well as a tool for eliciting Claire's TK. Will selected incidents from the lesson observation in order to phrase his questioning afterwards. This was an effective way of probing particular areas of Claire's teaching which Will wanted to understand further, for example her intonation and volume:

> *Will: So I noticed that when you were giving those warnings you maybe change your voice* (line 102, Appendix D).
>
> *Claire: You tend to go deeper. So if you're just talking in general I find I might have a bit of a softer voice or more of a projected voice if I wanted to give them*

> *instructions. Then if I'm not happy with the noise levels, the voice deepens a little bit, even though it's hard to note my voice deepening. But the tone changes and it becomes more assertive and slower [...] It's like saying without actually having to say I'm not happy* (lines 105-110, Appendix D).

Recounting specific, observed actions/events stimulated Claire's recall of the thought processes she had in the act of teaching. The questions embedded in shared recent experience gave rise to detailed answers about Claire's actions and knowledge in use. The STR interviewing exemplified that her memory structures were 'enhanced... by use of a prompt' (Gass and Mackey, 2007: 95) as referred to in Chapter Two. Claire was able to explain and give reasons for her teaching. So, as a method for accessing Claire's TK the STR interview proved effective.

The explanatory nature of Will and Claire's interview contrasts with research findings which have revealed 79% of mentor-ST conversations to be largely descriptive recounts of lesson events (Edwards and Protheroe, 2004). The STR interviewing method encouraged Will to ask questions which required an explanatory and focussed response. Claire's TK guiding her approach to setting homework, for example, was allowed to come to the fore in this interview. Will grasped, more fully, the factors Claire was considering in her approach to successfully setting homework for a whole class. Similar to Ethel and McMeniman's (2000: 93) 'cognitive apprenticeship' intervention, which found one ST saying *'this is the first time I have been able to sort of get inside a teacher's head and get a glimpse of all the things he thought about which influenced what we were seeing as his teaching',* the STR interview encouraged Claire and Will to hold a conversation which focussed on explaining and justifying aspects of the lesson; this is in contrast to a descriptive recount of lesson events.

Factors encouraging access and understanding

Having Will in the position of interviewer was a factor in accessing Claire's TK. This position allowed him to probe into areas of Claire's teaching which she may have otherwise taken for granted. This relates to Eraut's (2004) work on TK, which highlights that as teachers gather classroom experience, many of the decisions and actions they take become routinised and not explicitly considered. Claire speaks as if the actions are obvious. However, this is not the case for Will and by asking the questions he had more influence over the information gained, increasing the likelihood that the resultant response from Claire would be of use. The following example shows Will wanting to know why Claire had asked a pupil to recap after she had already told the class what to do:

> *Will: Why do you get pupils to recap when you've given them instructions?*
>
> *Claire: Yes I do try to do it as often as possible. The reason why I get them to recap is sometimes I may not have given an instruction clear enough for every single person in there to understand it and pupils are better at explaining in their own language what needs to be done. So for that reason and secondly it makes sure that everyone is listening. I've told them once, possibly twice, then I've got someone else to tell them. They've had at least two possibly three explanations of the same task that they have to do, making sure that they all understand* (lines 30-39, Appendix D).

Here, Claire is very clear and persuasive about the need for the repetition. This TK may have remained undisclosed had Will not had the opportunity to question in the STR interview. Claire outlines why asking a pupil to repeat the task is a useful tactic

(accessible language, everyone will need to listen) and confirms that instructions may need to be repeated (here, up to three times) for all in the classroom to understand. Therefore, Will being in the position of interviewer was a factor in accessing Claire's TK. This is echoed in the work of Hagger and McIntyre (2006), where nuances revealed through questioning would, potentially, have been taken for granted by the mentors had the STs not had the opportunity to question as they did.

The specificity of Will's questions could be seen as another encouraging factor in accessing TK. As Will was able to see Claire's teaching and pick out events of interest to him, this led to Claire responding to tailored incidents; focussing on the areas Will wanted to understand further. Generalised comments, or descriptive recounts (Edwards and Protheroe, 2004) were kept to a minimum, instead explanations and reasoning for teaching actions were provided.

The use of specific lesson incidents in the post-lesson STR interview was an encouraging factor in accessing TK.

Here are two of Will's questions highlighting specific lesson incidents:

- *I notice that you have the objective written on the board. It's sort of the first thing that you do when the class come in. Why did you do that?* (lines 2-3, Appendix D).
- *So in the starter activity [...] they were having a class discussion and you were always saying - when they give an answer- you were always saying 'why'. Why did you keep asking why?* (lines 18-20, Appendix D).

As a method for uncovering the tacitly held knowledge of mentors, it is widely agreed that questions play a significant role (Brown, Collins and Duguid, 1989; Fenstermacher, 1994; Ethel and McMeniman, 2000; Eraut, 2004 & 2007; Burn, 2006; Dudley, 2013). My

research corroborates the importance of ST questions, suggesting that it was the specific nature of Will's questions, embedded in recently observed teaching, which was an encouraging factor in provoking equally specific answers, uncovering TK.

In case study one I have discussed the role of TK in unveiling the complex, multi-layered nature of Claire's decision making, the STR interview as a method to access TK and having Will in the position of interviewer as an influential factor in accessing Claire's TK.

4.1.2. Case study two: Adam (ST) and Stephen (mentor)

Adam (age 27) and Stephen (age 33) worked in a co-educational, comprehensive school and the observed lesson was taught to a year nine class focussing on the Kobe earthquake. The interview took place later the same day in a humanities team room. Adam and Stephen were the only people present during the interview.

Adam and Stephen's interview centred around three key aspects of the observed lesson with Adam pinpointing certain aspects of the teaching, asking why Stephen had chosen particular courses of action. The three key aspects were:

- Differentiation
- Pedagogy
- Behaviour

The role of tacit knowledge

The STR interview contained a discussion of Stephen's reasoning which had been guiding his teaching. Adam asked about differentiation and how different types of pupils were

being supported. Stephen raised two main strategies for differentiation which Adam may have not been fully aware of at the time of observation:

> Adam: *In terms of differentiation,...how else did you differentiate throughout that?*
>
> Stephen: *I'm aware of the other pupils that will struggle in that situation and one pupil wasn't able to keep up with the flow of the lesson. I used my lesson plan itself, which has all the definitions...and gave that to pupils so that they can therefore use it to catch up and keep up with the rest of the class. So, a lot of the top end pupils would have done without my assistance, whereas you heard me repeat myself a few times for the weaker pupils that were trying to catch up.*

Adam was interested to know if this form of differentiation had been planned in advance or was responsive, to which Stephen acknowledged it was a responsive technique. This illustrated to Adam the role of TK in classroom teaching as Stephen revealed he was responding to the unfolding classroom dynamics.

> Adam: *Was that a responsive technique? Had you planned to do that from the beginning or…*
>
> Stephen: *That's a good question. No, not really. It was really more of a response to seeing him not keep up, so therefore it's reactive differentiation which I'm always planning to have in my locker just in case I need to, but no it wasn't planned for. So I had the ability though to differentiate if I needed to.*

Adam asked for reasoning and clarification over Stephen's choice of a teacher-led style and the use of a ten minute video clip. Adam was keen to understand why the lesson had been directed in a teacher-led style with a focus on didactic learning.

Adam: Why did you decide to lead the lesson, rather than getting them to lead it?

Stephen: It was their first time learning about an earthquake. I was just trying to get the foundation knowledge in there for them. So the teacher talk was to build a foundation and then afterwards other lessons allow them to do it themselves, more pupil learning, that sort of thing.

Stephen's underlying reasoning which was revealed here allowed Adam to see that a teaching approach can be chosen with a purpose in mind. When STs observe experienced teachers, accessing the TK which underpins the teaching approach chosen could play a useful role in realising that, for example, certain types of teaching approach are best suited to particular subject matter or particular pupils. In the example above, Stephen explained that his didactic approach was chosen for the introductory section of the topic on earthquakes as a way to provide a knowledge base for pupils. This type of information is useful in enabling STs to make sense of when to use different teaching styles and strategies. Without this information STs could replicate a teaching approach inappropriately, not fully understanding the pedagogical implications (for example, why didactic teaching or group work may not be suitable in certain situations and with certain subject matter). So, TK seems to have an important role to play in understanding the implications of teaching choices.

Ways to access tacit knowledge

In a similar way to Will in case study one, Adam also used particular lesson incidents in his questioning to highlight areas he wanted to understand more fully. This was effective at directing the interview and in eliciting the desired information and confirms Eraut's

(2000) suggestion that mediating artefacts (in this case taken to be an identified behaviour) are helpful in supporting the elicitation of TK. Adam asked about the TK informing an action that Stephen took at a key point in the lesson, when one pupil was causing a disturbance:

> *Adam: What about the behaviour for learning throughout that video, because you had to stop it at one point?*

In identifying one behavioural incident in his questioning, Adam provoked a response from Stephen which illustrated how he uses more than one explicit action (here, stopping the video) to respond to and manage behaviour in the classroom.

> *Stephen: Yes, but then I think that's what you may need to do. As long as I'm on my toes and always watching the pupils and making sure that they're paying attention. I identified who was my main character for disruption and that's why he's at the front of the class at the moment, so I know I can keep an eye on him and keep him focused. Actually I recently moved him next to someone that he does actually kind of work quite well with and keeps them focused.*

This is further evidence that questioning which revolves around a specific incident from a shared lesson is a useful method for eliciting TK. Stephen's response was focussed on Adam's question and uncovers his TK in use when managing behaviour; including constantly monitoring attention levels and having a seating plan strategy.

Factors encouraging access and understanding

Some of Adam's questioning had an element of judgement. One example of a judgemental question was as follows:

> *Adam: The video was quite long to what I've seen before. I think it was about 10 minutes or something...What are your thoughts on the length of it?... Do you think it could have been more productive with shorter clips?*

Stephen's response to Adam's question highlighted pupil engagement as a reason for a longer video clip:

> *Stephen: I think sometimes you need a lengthier clip as well to get more information across because with these types of disasters.. you can't really sum it up in one minute 30 seconds, not enough for the pupils to really become engaged as well. So I think I was using that video for a bit more pupil engagement as well as trying to have an open discussion at the end of it...so that's why it had to be a little bit longer than normal.*

The video clip came up again later in the interview with Stephen suggesting it was '*not as engaging as it could have been*', which contradicts earlier reasoning. This suggests that that judgemental questioning may have stimulated a defensive response and therefore could be potentially detrimental to encouraging access to TK. How STs are prepared for STR interviewing and the affective dimension of such an interview is key here and echoes Zanting *et* al's (1998:24) suggestion that STs 'should not show disapproval' when questioning their mentor. Tomlinson (1995: 217) describes scenario where 'a mentor struggling to articulate their thinking may interpret this as a case of them not knowing

what they were doing as a teacher. If a trainee [ST] then asks about their teaching the mentor may respond defensively'.

However, a little later Stephen reflected upon the possibilities for altering the way he uses video clips:

> *Stephen: What you suggested, the idea about breaking the video up could be a good idea. Have video, discussion, video, discussion. So that might be something I'll consider in the future putting in.*

Here, Stephen is reflecting on his teaching; openly considering different teaching approaches in collaboration with Adam. The collaborative element and Stephen's willingness to reflect on his actions could be an encouraging factor in allowing access to his TK as advantages and disadvantages of different teaching possibilities are openly appraised. Whether or not a mentor is open to a collaborative discussion of different teaching approaches is discussed in the literature and relates to how a mentor views his/her role. Kemmis *et al.*, (2014: 156) highlights ways in which mentors can view their role including: 'supervisory', 'professional support', or 'collaborative self-development'. Here, in case study two, there are signs that where Stephen was able to openly reflect and consider possible alternatives to his teaching (as collaborative self-development) this encouraged Adam access to his thinking.

This case study has shown that the role of TK can enhance ST understanding of how teachers' decisions can be changed when in the act of teaching and that teaching style can be linked to pedagogical factors; e.g. subject content or progression. The use of specific classroom incidents was seen as a method of accessing TK and the possibility that ST questions which provoke mentors to consider alternatives encourage access to TK.

4.1.3. Case study three: Laura (ST) and Stephen (mentor)

Laura (age 23) and Stephen (age 33) were based in a co-educational, comprehensive school and the observed lesson was taught to a year seven class focussing on the Easter story. The interview took place later the same day in a humanities team room. Laura and Stephen were the only people present during the interview.

Laura and Stephen's interview centred around four key aspects of the observed lesson, with Laura pinpointing certain aspects of the teaching and asking why Stephen had chosen particular courses of action. The four key aspects were:

- Praise and reward
- Behaviour management
- Lesson structure
- Managing discussion

The role of tacit knowledge

The TK revealed throughout this interview played a role in developing Laura's understanding of why Stephen had different responses to behavioural issues. The majority of the interview focused around pupil behaviour and ways to maintain the attention of the class. Laura asked questions about why Stephen had responded to different pupils in different ways. For example:

- *You gave Jake a warning...why was it at that point and not earlier on?*
- *I noticed at the start of the lesson it was maybe you waiting for the class to be quiet...but then towards the end it was getting more, you'd raise your voice a bit more, trying to quieten them.*

The STR interview allowed the reasoning behind Stephen's different behaviour management decisions to be explained further. The seemingly inconsistent decisions were an area which Laura wanted to explore. In one instance Laura asked why Stephen sometimes seemed to ignore disruptive pupils and Stephen was able to clarify his actions:

> Stephen: *Yeah, I may have put off a few of his shouting[s] out, but at the same time I think at first it was quite low level and it wasn't as majorly disruptive at that point. I felt like it was beginning to escalate further, not just from Jake but from everybody else. So, in a slightly unfair way, I've used him as that benchmark*.

Contextual and pupil specific reasons for the actions he had taken in the lesson were given. Stephen's TK unveiled why at times he would wait for quiet and other times (in the same lesson) he would be more pro-active about verbally asking for quiet:

> *Stephen: So I know at the start of the lesson I've got a bit of time that I can use and hoping that they will happily work efficiently and I can make that time up. But near the end...the reason why I was raising my voice as well was not only just down to pace and wanting to keep the lesson flowing, [it] was the fact that I was asking questions of people...Pupil[s] would be drowned out because other people would think that that's their time to talk over the top of them.*

This is an example of how TK can play a role in developing a more sophisticated understanding of what lies beneath experienced teacher's observable actions, highlighted as important (Toom, 2006, 2012; Hegender; 2010; Dudley, 2013). Stephen's tacit understanding of pupil behaviour and when to enact certain teaching strategies are explained. Through STR questioning Laura understands more fully the reasoning behind Stephen's seemingly random responses to pupil behaviour, potentially helping her to

avoid mimicry in inappropriate situations in the future (Wilson, 2013). The STR interview allowed Laura to probe Stephen's actions, helping her to ascertain the reasoning in his seemingly varied approaches.

Ways to access tacit knowledge

Laura was able to use specific parts of the observed lesson throughout the STR interview and this was useful in stimulating a response from Stephen which answered the question directly and provided access to his TK in use.

Laura had observed Stephen giving pupils praise in the lesson and she was keen to ask if he was explicitly trying to emphasise praise through his voice, or if this had come naturally. The following quote illustrates Laura's direct questioning regarding this:

> *Laura: I noticed you changed your praise and enthusiasm in your voice with different answers varying on degrees of quality of answer, I guess. Was that something you do on purpose, or naturally comes to you?*
>
> *Stephen: I think it's coming naturally nowadays but it's definitely something that I do on purpose. It's - I - yeah believe praise is really, really important. But again, you can't just always give generic praise all the way through. You've got to somehow try and change that evidence.*

Here, Laura specified the teaching element she observed and asked for further information. Stephen's response is tightly focussed on Laura's question regarding whether or not his praise was purposeful or natural.

Another example of Laura accessing Stephen's TK occurred when she wanted to understand why a pupil's poor behaviour had been ignored:

> *Laura: Okay, and at one point Ed was shouting comments [..] did you choose to ignore it on purpose for time reasons?*
>
> *Stephen: It's not done for time reasons, because of Ed as - that sort of pupil - he seeks attention for a lot of the lesson. So I purposely choose to ignore him, because if I give him this sort of attention then it very quickly can escalate into a loss of time as he will try and have a classroom argument or have a discussion or try and find a way to get other people involved to try and kill time or get my attention.*

This example shows that, during the interview, Laura accessed the TK Stephen was using at the time of teaching; the TK implicit in actions in dealing with Ed, which she had not fully understood solely from the observation. The use of a prompt (as suggested by Gass and Mackey, 2007), here, the recall of Ed's shouting, was able to stimulate Stephen's memory of the event and the reasoning for why he ignored the shouting.

Factors encouraging access and understanding

Towards the end of the interview Stephen was asked if he would change any aspect of the lesson, if he were to do it again. He suggested possible changes to the lesson and was able to recognise where there was potential for improvement. This reflection allowed access to Stephen's TK regarding the management of whole class discussion:

> *Laura: If you taught it again, would you do anything differently?*

Stephen: Yeah, no, definitely - there was a lot of classroom discussion [..] maybe I'd try and encourage a bit more from everybody to try and get [more] involved in classroom discussion because sometimes in that situation you get the very strong, dominant ones that are taking over. So, definitely try and draw in some of the quieter ones that may also have excellent answers.

Where Stephen was able to recognise possible areas for change in his own teaching he was increasing the access to his TK; helping Laura to see the pros and cons of different teaching approaches. This example supports the view that mentors who are able to evaluate their own teaching and recognise 'tensions inherent in opting for one strategy or another' (Burn, 2006:249) are effective in encouraging ST learning.

During the STR interview Laura asked the questions and occasionally suggested answers prior to Stephen being able to respond. For example:

Laura: Then when you stopped for the true or false activity, was that based on generally you could hear the noise level rising and you thought, everyone's finished, or you had a look around and noticed everyone with filled-in sheets?

Whilst there is no clear evidence to confirm Laura's suggested answers influenced Stephen's eventual response, it is a possibility. Some of Laura's questions could be classed as leading questions and the exact impact of this is unknown.

This case study has shown how accessing Stephen's TK helped Laura to understand the sophistication in his behaviour management strategies. Having Laura as interviewer, pinpointing incidents to discuss, was shown to be an effective way to access TK. Also, the ability for Stephen to critique his own teaching was highlighted as an encouraging factor in allowing Laura to access TK.

4.1.4. Case study four: Rebecca (ST) and Stacey (mentor)

Rebecca (age 23) and Stacey (age 40) were based in a co-educational, comprehensive school. Rebecca observed Stacey teach a year 10 lesson which was a revision lesson for an upcoming GCSE examination on earthquakes and volcanoes. Rebecca was able to hold a post-lesson discussion with her mentor (Stacey), but the interview failed to record. The nature and content of this discussion was the focus of interview four; facilitated by me (as the researcher). There are limitations to the data as the validity of the exact nature of what Stacey (mentor) said is reduced due the interview being a memory of a conversation held. This interview does reveal what Rebecca could recall from the discussion with her mentor and so can show what was learned through the post-lesson discussion.

Rebecca had been teaching the class for several weeks prior to the observation and had knowledge of the pupils in the class. She had been teaching a scheme of work which became the focus of revision in the observed lesson being taught by Stacey. During the interview with me, Rebecca focused upon what she had observed in the lesson and spoke of the reasons, given by Stacey, for the teaching actions.

The role of tacit knowledge

The class Rebecca observed were revising and there was a heavy focus on preparing pupils effectively for an examination. Rebecca said the word 'exam' eight times throughout the interview and suggesting the upcoming exam was a driving force for many of the teaching decisions taken by Stacey. For example, Rebecca commented: '*she introduced the questions first of all...to drum in the importance of the exam questions*' and '*she explained about all the separate case studies...and how they're very important*

for [the] exam'. Rebecca was clear that preparing pupils for the forthcoming exams was an influential factor in the teaching decisions.

Different teaching strategies used within the lesson were discussed and Rebecca understood that Stacey was *'asking the questions, as in, [they] should definitely know this answer, and like looking at people who should definitely know this answer to achieve their target grades'.* Eye contact and pausing were raised as non-verbal teaching strategies. Having the opportunity to discuss Stacey's TK guiding the non-verbal teaching strategies clarified the purpose of these strategies for Rebecca. Without the post-lesson discussion the non-verbal strategies may have been an element of the lesson to go unnoticed or unexplored through observation of Stacey's teaching alone. This suggests that accessing Stacey's TK played a useful role in Rebecca's learning.

A hands down approach to questioning had been used in the lesson and Rebecca spoke about this, stating that Stacey had done this to *'establish who in the class knew and [so it] wasn't just the same people answering; [getting] the whole class involved'*. Rebecca knew that Stacey had been pitching questions at different levels and that she could establish whole class understanding, judging by certain pupils:

> *Rebecca: So to get the pace of the lesson she was asking higher ability pupils [pupils]. To really get the understanding of what maybe the class as a whole definitely [knew], she would go to the lower ability.*

This is a further example of how accessing experienced teachers' TK can reveal different purposes for the same teaching action (in this example, questioning); something STs are novice at interpreting initially.

As a result of the discussion with Stacey, Rebecca was able to give justification for the teaching methods employed, seeing the link between decisions taken and the learning outcomes achieved. Here, in relation to engaging the class:

> Rebecca: *Constantly moving around the classroom to make sure they're all listening, not fiddling.*
>
> Rebecca: *She [Stacey] always expresses the importance of the lesson right at the beginning, so they know they need to focus for this lesson because it's going to be - it's posed as such a vital lesson to their learning. So immediately then it's - right, we need to listen...That's really useful to see.*

In this quote, Rebecca illustrates she developed two useful ideas regarding behaviour management from her discussion on TK with Stacey: the importance of circulation and identifying lesson relevance.

Whilst the intended STR interview between Rebecca and Stacey was not able to be recorded the subsequent interview did show that Rebecca could recall various teaching ideas in light of the discussion she had held with Stacey.

Teaching ideas recalled by Rebecca included:

- how to increase the importance (for pupils) of lessons covering exam content
- ways to keep up the pace of a lesson
- how to establish a sense of which pupils are falling behind in their understanding
- communicating with individuals via eye contact when managing whole class discussion
- ways to increase participation in the lesson

Ways to access tacit knowledge

With no recording or transcription of the conversation between the mentor and the ST the data for analysing the ways in which Rebecca questioned her mentor and the specifics of Stacey's responses were very limited.

Factors encouraging access and understanding

Rebecca was able to infer some of her own connections between Stacey's teaching actions and the reasons guiding these actions. Rebecca commented '*because I know the pupils with SEN or...[those that] just need that encouragement, it's so much clearer knowing these pupils why she was doing what she was doing'*. It was unclear which aspects of Stacey's TK had been accessed and developed through the post-lesson discussion and which had been as a result of Rebecca having previous experience of teaching with that class. For example, Rebecca noted '*they can be quite challenging at times, they need to have that focus',* showing her familiarity. Having previous experience with the pupils enabled Rebecca to draw her own conclusions about what Stacey was doing and why.

There are implications for accessing TK at different stages of learning to teach with Rebecca's interview suggesting that familiarity with a class (prior to observation) enabled her to make the connections between observable teaching and the TK in use. For STs, the use of previous experience, knowledge of the pupils and the ability to ask particular types of questions, develops across the course of a PGCE (Hagger, 1995; Buitink, 2009). This case study shows that Rebecca's understanding of what Stacey was doing was enhanced due to the contextual understanding she had developed. This suggests an encouraging

factor in accessing TK may be the previous teaching experience Rebecca had, enabling those connections between teaching actions and TK to become more obvious.

Despite the loss of the original data my interview with Rebecca made a useful contribution. The case study covered how accessing Stacey's TK led to greater understanding of how examinations can influence teaching decisions and revealed developments in Rebecca's understanding of Stacey's non-verbal teaching strategies. Rebecca's prior experience of teaching and the contextual understanding she had developed were also highlighted as encouraging factors in accessing TK.

4.1.5. TK accessed throughout the case studies

The case study data revealed that STs were able to elicit the TK of their mentors and that asking questions regarding specific lesson incidents encouraged mentors to explain their theories in use at the time of teaching. ST questions were a key factor in encouraging mentors to reveal their TK and these were often phrased as 'how' or 'why' questions. For example:

- *Why do you get pupils to recap when you've given them instructions?*
- *Why did you do that?*
- *When they give an answer you were always saying why. Why did you keep asking why?*
- *What was the idea of that, what was the thought process behind that?*
- *Why did you decide to do that, why was that a good idea?*
- *How do you generally know that they've got it written and they've understood what you actually want them to do?*
- *How do you sort of maintain the quiet while they're on task and keep that low level of noise?*

In order to illustrate several examples of TK explicated from the different cases Table 4.2. combines a range of comments from all four interviews. The interview comments also reflect that different types of teaching judgements were discussed; identified in the table as tacit, reactive or deliberative.

As discussed in Chapter Two, (Wilson and Demetriou (2007) outline three different types of teaching judgements: tacit, reactive and deliberative (see Table 2.1 on page 34). These different judgements require different amounts of time and are used in different situations. As teachers become more experienced, and in order to reconcile competing concerns (Kennedy, 2006), classroom judgements involve an increasing amount of TK which enables the practice of teaching to become a more fluid and automatic procedure. All three types of teaching judgements were revealed in discussions between STs and mentors, illustrating that the STR interview method encouraged STs to access the deeper level understanding which informs mentors' practice. Table 4.2. exemplifies that mentors were able to explicate their TK during the STR interviews.

Tacit Judgements	**Reactive judgements**	**Deliberative judgements**
'Hot' action Laura: *Was that planned or you just thought on the spot?* Stephen: *It was kind of on the spot. Yeah I noticed that he was moving quicker than everybody else was...so I gave them something different to do there.*	**Judgements linked to the actions and the classroom environment** Stephen: *But then [I] also moved around and just saw that a lot of people had got on, so I'm kind of pitching myself off different pupils of how quickly they can work.*	**'Cooler' action** Laura: *The first half of the lesson was a lot of discussion...Do you think if you taught that again would you limit that?* *Stephen: Yeah, I may have limited some of it, maybe try to make that shorter or make it a little bit more straightforward...So, I think, yeah, maybe in the future I would limit the starter activities - allow the pupils to get more out of [..] the main body of the lesson*
Judgements based on intuition Stephen: *I'm aware of the other pupils that will struggle in that situation and one pupil wasn't able to keep up with the flow of the lesson. I used my lesson plan itself, which has all the definitions*	**Respond to affective and social contexts** Rebecca: *Because I know who the pupils are with SEN needs ... it's so much clearer knowing those pupils why she was doing what she was doing, or why she's*	**Judgements based on deep understanding** Will: *I notice that you were using 'what if' quite a lot. When the kids said an answer you'd sort of give them an alternative scenario where you said what if, what if*

in front of me, and gave that to that pupil so that they can therefore use it to catch up and keep up with the rest of the class.	*asking those people and then the others.*	*this happened?* Claire: It's higher order thinking skills, it allows the pupil to think beyond the situation that they are in. So if they've been given an aspect or a situation that they need to look at without prompting they will only look at that situation as it is. But if you change that and give them a what if for, the stadium wasn't near the river or something like that, it allows them to think a bit more outside the box
Mainly emotional responses Stephen: *In that lesson ... there were some excellent answers and that's why my voice would have changed. Again, that's my technique that I'll use. I will change what I say to a pupil or how I react. I may act more positively or more enthusiastically if a good answer has come across to give that level of praise.*	**Knowledge of action** Stephen: *Yes. I think I did focus more on certain aspects of that lesson. Last year I may have just taught it straight out but near the end of the lesson my plenary was to gear up about what are the important factors of why people - so many people- were affected by it. I was trying to make sure the pupils picked out the key points and the main reasons.*	**Cognitive domains are involved** Claire: *So if you know what the homework is going to be [..] just stop at the middle or tell them to put it in at the beginning of the lesson. It gives you time then to make sure that they've all done it and all understood it rather than them wanting to go out for their break.*
Knowledge in action Laura: *At one point Ed was shouting comments but it wasn't really that loud, but did you choose to ignore it on purpose?* Stephen*: So I purposely choose to ignore him, because if I give him this sort of attention then it very quickly can escalate into a loss of time as he will try and have a classroom [..] or try and find a way to get other people involved to try and kill time or get my attention.*		**Knowledge for action** Researcher: *With the hands down questioning, could you see why she was asking the different pupils particular questions?* *Rebecca: So to get the pace of the lesson she was asking higher ability pupils. To really get the understanding of what maybe the class as a whole definitely should know, she would go to the lower ability.*
'Act' like a teacher Stephen: *As long as I'm on my toes and always watching the pupils and making sure that they're paying attention*		**'Think' Like a teacher** Will: *Why did you keep asking why?* Claire: *It's to check their understanding. Most pupils will be able to give you a basic answer. Either because they've heard it being said, or they've discussed beforehand from someone else, but they might not know the reason as to why they've given the answer. So by extending the*

		question and asking why, that then gives you an indication of that the individual understands exactly what they are saying.

Table 4.2. ST and mentor interview comments revealing three types of judgements

(refers to Table 2.1 on page 34)

Wilson and Demetriou (2007:224) divide tacit judgement into 'hot' action, intuition, emotional responses, knowledge in action and acting like a teacher. For each type of tacit judgement a corresponding interview discussion point is available. For example, a question asked by Laura who wanted to know how Stephen was thinking 'on the spot' relates to 'hot' action. Relating to 'judgements based on intuition', Stephen discussed teaching actions which were based upon his knowledge of the pupils and his awareness of their potential needs. 'Emotional responses' were discussed as Stephen explained how his voice reacts to good answers in the classroom. Knowledge *in* action was exemplified as Stephen made it clear to Laura that he had made the decision, whilst actively teaching from the front, to ignore one pupil (as he was attention seeking) and, lastly; 'acting like a teacher' was raised with comments such as *'keeping on your toes'* and '*obviously watching the pupils'* confirming the physical (performative) nature of active teaching. All of these discussion points show TK being openly discussed in an explicit (and more deliberative) sense, allowing STs access to their mentors' TK during the STR interviewing process. Previous research has shown that mentors' feedback conversations do not always provide opportunities for STs to 'appropriate the practical knowing which might assist their later interpretations and responses' (Edwards and Protheroe, 2003: 230) whereas my research exemplifies a method which encourages exactly that.

4.1.6. Case studies summary

The case studies included four STs observing their mentor teach and then subsequently holding a STR interview afterwards (three of which were recorded). All four case studies show that the mentors' TK was accessed and revealed through ST questioning. The STs were able to decide upon key features of the observed lesson to discuss in further depth. The case studies illustrate that TK can play a role in furthering ST understanding of complex teaching issues, particularly those which are inaccessible through observation alone; for example non-verbal teaching strategies. Through the interview questioning STs were able to build their understanding of the mentors' TK guiding seemingly contradictory or random teaching decisions; and also to appreciate that mentors adapt their teaching in response to classroom events.

The case studies used STR interviews as a method for gaining access to the mentors' TK and, as a method, proved effective in a number of ways: The STs were in control of the agenda for discussion and prompted further understanding of classroom events, seeking to uncover the TK which had been in use at the time. Having the ST in the role of interviewer enabled the post-lesson questioning to be tied to the interests and concerns of the ST. The stimulated recall aspect of the interviews encouraged specific moments to be explicated and the TK (in use at the time of teaching) was recalled and revealed as a result.

Factors which encouraged STs to access and develop their understanding of TK were revealed through the case study data. The preparation prior to the STR interviews resulted in STs remaining focussed on uncovering their mentors' TK; the interview content remained relevant to the aims initially set out. Having some prior experience of teaching the pupils within the teaching context was useful in supporting STs to make the

links between their mentor's actions and the TK guiding those actions. Where mentors were openly reflective about their own teaching and were willing to consider alternatives (including the pros and cons of the alternate strategies) this seemed to encourage greater ST access to TK. Case study data suggested that the mentors' responses could be influenced by the style of questioning the STs used. Questioning which insinuated the mentor's teaching actions or decisions may have been inappropriate, or could have been improved, led to (on one occasion) a defensive response which did not lead to TK being discussed or revealed.

4.2. Questionnaires

Questionnaires were sent to a wider population of PGCE geography STs and mentors. This was in order to understand how STs and mentors defined TK and to collect information on the perceptions of the role of TK in ST learning. The possibilities for accessing TK from mentors or other experienced teachers were also explored. The results of the ST questionnaire and the mentor questionnaire are presented and considered in this section. A list of the SurveyMonkey questions which were sent out to mentors and the questions sent to STs are available to see in Appendix E.

Bar graphs have been used below to provide a visual representation of the questionnaire data. Bar charts show nominal data as discreet categories and were chosen because 'where data is [sic] collected on a nominal scale or if the categories are qualitative then a bar chart is most appropriate' (Jackson, 2014: 109). Whilst there is a scale of agreement (Likert) for the closed questionnaire responses the intervals between responses are not set or uniform and therefore a bar chart shows the responses as discreet units.

4.2.1. Mentor questionnaire

The mentor questionnaire was aimed at gathering information on mentors' perceptions of TK and their thoughts on if and how TK could play a role in ST learning, including the potential for STs to access mentors' TK.

Defining TK

All of the mentors gave a response to the question asking them for their own definition of TK. These were as follows:

- *Knowledge that can only be gained from experience*
- *Knowledge gained through experience and that is acted upon, instinctively, without too much thought*
- *Knowledge which pupils are yet to apply, which they need help releasing and applying*
- *Knowledge that is passed on without any written rules*
- *An inherent procedural ability*
- *Learning by doing*
- *Knowledge that is 'subconscious'. You know it but you don't know how you know it*
- *Trying to teach instinct*
- *Knowledge that you can only gain first hand and is difficult to verbalise to another person*

As can be seen (underlined above) in the mentors' definitions of TK, there was a high importance on '*experience*' or '*action*'. Mentors identified first-hand experience as important in developing TK for teaching use and this is reflected in the literature on TK.

Five of the nine mentor responses could be considered to reflect the view that TK is developed through experience (and therefore implicitly learned through actions). This

corresponds with the literature as Niiniluoto (2001) as well as Argyris and Schön (1984) see skill as a stage of development that precedes knowledge; i.e. one develops TK through action rather than formally learning it through acquiring propositional knowledge. In my research the focus is on STs explicating mentors' existing TK as opposed to building their own TK through practical experience.

There were different views about how accessible TK is as a source of knowledge. This has implications for mentors' use of a strategy which tries to access TK (and make it an explicit focus for discussion), and as one mentor defined TK as '*subconscious*' this suggests conscious attempts at explicating TK may be seen (by mentors) as difficult, or even, not possible. It is acknowledged in the literature that expert teachers find it is difficult to rationalize and articulate what is actually going on in their classrooms and why (Wilson & Demetriou, 2007) and how mentors define TK has implications for the extent to which this type of knowledge will be focussed on and used in mentoring. One mentor highlighted this with the comment that TK is '*difficult to verbalise to another person'.*

<u>The role of TK according to mentors</u>

All nine mentors agreed they used TK in all or most of their lessons (Fig. 4.1) and concurs with Eraut's (2000: 128) vision of TK as 'crucial' to professional work. Most mentors (85%) considered TK to be very useful in the learning to teach process (Fig.4.2). This shows TK has an important role in ST learning, as defined by mentors.

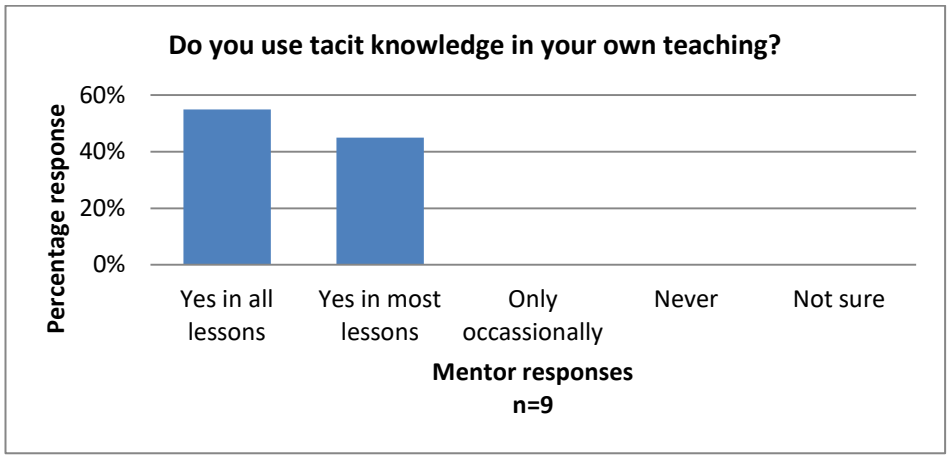


Fig. 4.1.

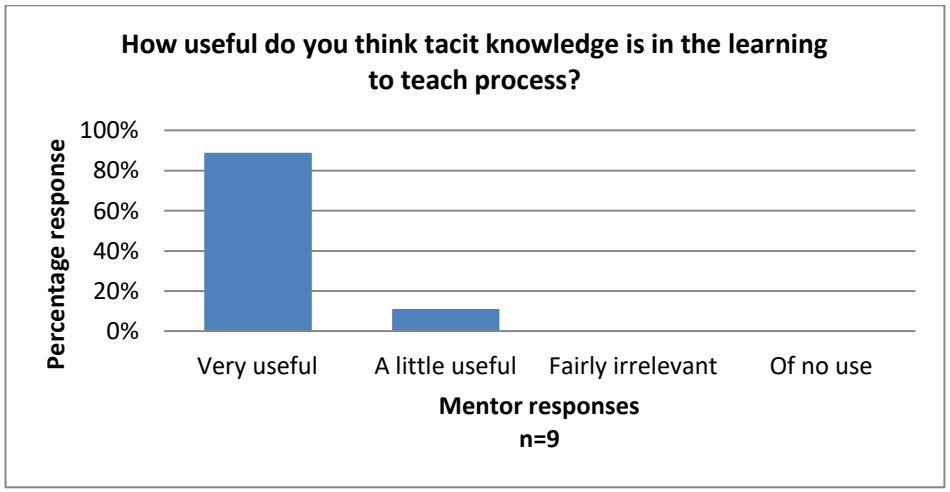


Fig.4.2.

Accessing TK

Mentors all agreed that their own personal TK was accessible to STs. Sixty six per cent of mentors thought TK was definitely accessible and the remainder (34%) thought a little accessible. This reflects a level of uncertainty about how much TK can be accessed within a ST-mentor relationship. As previously discussed in Chapter Two, Fugill (2012:2) states that 'articulation of such knowledge rarely takes place and can be difficult'. However, with all mentors agreeing that their own TK was accessible to STs, the difficulty of articulation could be questioned.

The following table (4.3) presents the mentors' suggestions for accessing their TK. Similarities between the mentors' suggestions and Eraut's (2000) suggestions for elucidating TK are shown.

Mentors' suggestions for elucidating TK	Comparable suggestions for elucidating TK (Eraut, 2000)
Discussions about lessons in weekly mentor meetings.	Regular mutual consultation
I think the interns should be in school more than 2 days a week as this will allow them to see what judgements I make on a daily basis	Regular mutual consultation
More time to discuss class / pupil progress and teaching techniques	Regular mutual consultation
Questioning teachers' decisions and getting them to fully justify their actions.	A relationship within which explanations are expected
Noting down questions to ask in a debrief as to the justification behind an action taken.	A relationship within which explanations are expected
By making a clear open show of the decisions they make in the class	A relationship within which explanations are expected
Looking through planned lessons	Using mediating objects e.g. picture/video
Observation followed by questioning	Using mediating objects e.g. picture/video

Table 4.3. Mentor suggestions for elucidating TK shown alongside comparable suggestions from Eraut (2000)

Eraut's (2000) guidance on ways to elicit TK are reflected in the mentors' suggestions in Table 4.2, indicating that mentors have an awareness of the methods for allowing STs to access their TK in order to support the learning to teach process. One of Eraut's suggestions for accessing TK, not raised by mentors, is having an informal relationship where 'work based issues can be discussed outside of a formal setting where 'riskier' comments may be possible' (*ibid.*: 120). Building this type of informal relationship could be a factor encouraging STs' access and understanding of TK. This is something which was not explored in my research but would be a valuable avenue of investigation in the future.

Two of the mentors' responses indicate the responsibility for questioning lies with the STs, for example: '*they [*STs] *should question teachers' decisions, getting them to fully justify their actions'*. Conversely, Carter and Gonzalez (1993:231) suggest that mentors should be responsible for 'think[ing] aloud in their conversations with STs, that is, to make their thinking about teaching events explicit'. This does raise questions over who initiates the appropriate questioning and who owns the responsibility for uncovering TK.

4.2.2. Student teacher questionnaire

The ST questionnaire was aimed at gathering information on ST perceptions of TK and their thoughts on if and how TK could play a role in their learning, including the potential to access TK from their mentors.

Defining TK

STs defined TK as follows:

- *Knowledge that you have ingrained in you that you have gained without knowingly doing so*
- *Bits of information picked up along the way, without having being explicitly told*
- *Knowledge that is difficult to transfer to another person*
- *Knowledge that is difficult to pass on because it is learnt by experience and is therefore hard to verbalise or write down as the knowledge is often not explicitly known to the practitioner*
- *A wealth of knowledge and techniques that are gained through experience of seeing what works under varying conditions*

- *Implicit knowledge that is <u>difficult to transfer</u> to others*

Definitions included uncertainty of the source of TK and a difficulty in accessing it (underlined above), with 83% responses referring to either the difficulty of accessing TK or an uncertainty over its source. The learning process is shaped by what we already know (Simon, 2000) and in the questionnaire responses STs believed TK to be difficult to access or were uncertain about the source of TK. This may be indicative that TK may not feature, in any explicit sense, in learning conversations between mentors and STs where this preconception is assumed.

<u>The role of TK according to STs</u>

A similar picture was revealed from the STs with all agreeing TK was either very, or potentially, useful in teaching (Fig.4.3). One ST presented a detailed understanding of how TK can support the fluid nature of teaching:

> *Embodied knowledge is characteristic of the expert, who acts, makes judgments, without explicitly reflecting on the principles or rules involved. The expert works without having a theory of his or her work; he or she just performs skilfully without deliberation or focused attention*.

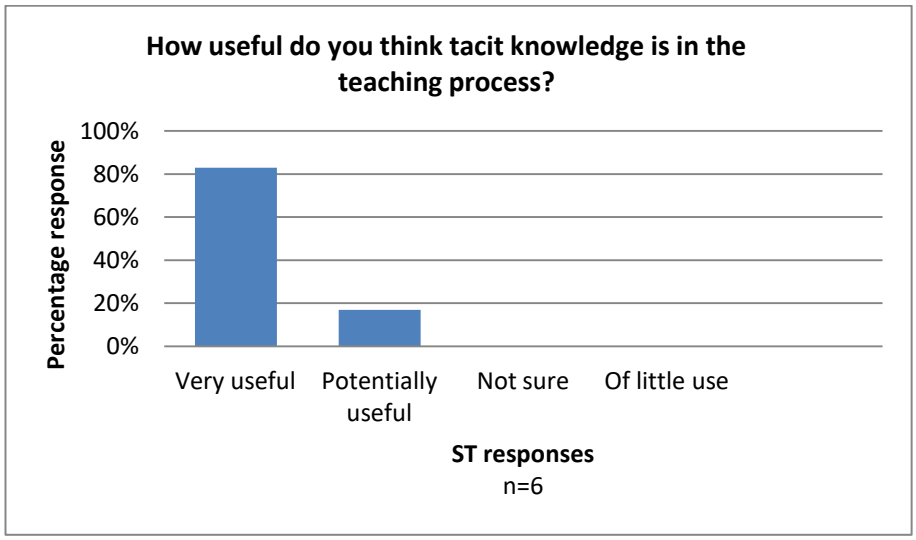


Fig. 4.3.

STs were asked if they thought they used TK whilst teaching. This question was asked two months into their teaching course therefore most STs would have done a small amount of teaching. One hundred per cent of the STs confirmed they did use TK to a greater or lesser extent in their teaching. A build up of practical experience was highlighted by one ST as a source of TK:

> *As experience increases, I don't have to think as consciously about the type of questions I am asking etc.*

Figure 4.3 reflects the high importance STs gave to TK within their own teaching and also recognition that as experience builds so does their reserve of TK.

Accessing TK

The majority (83%) agreed that accessing their mentors' TK was 'very useful' in the learning to teach process (Fig.4.4) with the remaining choosing 'potentially useful'. This information shows TK has an important role in ST learning, as defined by STs themselves.

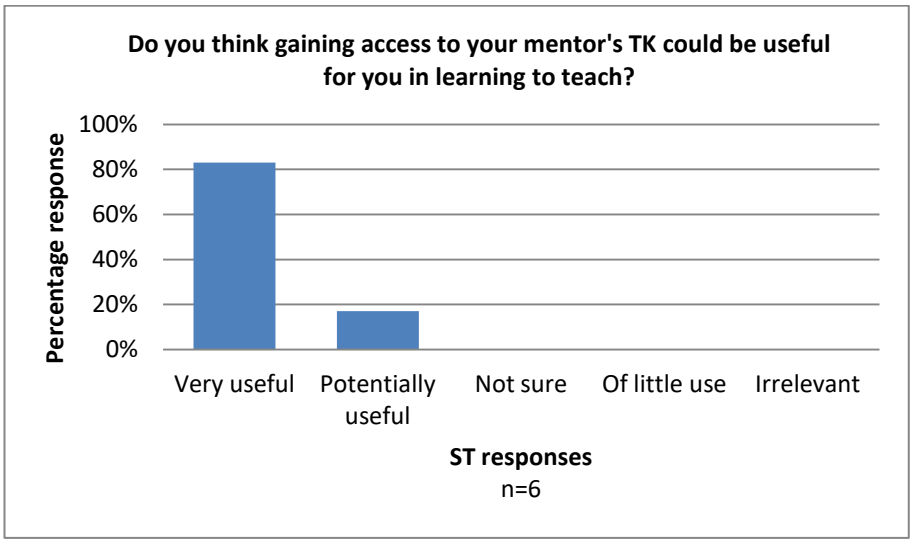


Fig. 4.4.

Question five asked STs to suggest ways of accessing their mentors' TK. Suggestions included 'scenarios' and 'talk' as useful ways to access mentors' TK. Observation and asking questions were mentioned less frequently by STs, with only 17% suggesting that asking questions may help. This reveals a difference in suggestions between the mentors and STs, with more mentors (33%) promoting the use of questions. However, when STs were asked what 'revealed most' to them about why teachers plan and teach in the way that they do, observing and/or discussion with teachers was mentioned in 50% of the ST responses. This suggests STs recognise the value of opportunities for shared observation and discussion, such as the STR interview process.

The link between context and TK was mentioned in 33% of the ST responses, for example:

> *It often seems to be class specific, so learning what they think about a class and the individuals in it often reveals reasons for doing things.*
>
> *The more I get to know the pupils, the more these reasons are revealed.*

These comments suggest that being part of the school context and knowing the pupils is an encouraging factor in developing an understanding of teachers' TK.

The questionnaires show that mentors and STs viewed TK as important in teaching and in learning to teach. Access to TK was highlighted as worthwhile and possible by mentors and although some STs highlighted TK as 'difficult to access', both groups were able to suggest ways to access TK with mentors identifying the use of questions more than STs.

4.3. Focus group

The focus group discussion took place early on in the data collection process and was a key tool in steering the subsequent steps of research.

The purpose of the focus group was to establish what STs understood by the term 'tacit knowledge' and if this type of knowledge was a feature of their discussions or practice within schools. Therefore, analysis of the focus group transcript followed what was established regarding these themes.

A highlighting tool was used in order to draw out where STs talked about the role of TK and also where access to TK was discussed. See Figure 4.5 for an example of the highlighting and coding.

Rachel: I think also like just chatting to them, like whether it be in mentor meetings **(b)** and you say OK so in this observation.... or like after a lesson. So there's another geography teacher whose not a mentor, she always like at the end of the lesson 'did you notice I did this' and we usually chat for another hour after the lesson **(b)** about everything she did and why and she said this person, I know that this has been happening and that and this, it's really interesting,**(a)** she'll talk about it for ages.**(b)**

R: So, lets you in on why she did things?

Rachel: Mmm, lets you in on reasons **(b)**

Elyse: And also its really good when one or two of the teachers are really open about the mistakes they make, during a lesson and they say ' I don't think I did it right actually', 'I should have done it differently **(b)** da da da da'. Its really, really good, you know as in that particular situation you know there is an alternative way of doing things.**(a)** So, some teachers are really, for me they are always commenting on their own teaching and kind of critiquing their own teaching practices **(b)** and I find it really, really.... Its not just useful in a practical way but it's reassuring because I understand that everybody's learning **(a)**, all of the time, so it's really great**.**

Key:

The role of TK **(a)**

Accessing TK **(b)**

Figure 4.5. Analysis of the focus group transcript – an example of highlighting and coding to extract information

4.3.1. The role of TK

The focus group established that there was hesitation amongst STs with regard to what was meant by the term 'tacit knowledge', with the group asking for clarification: *'they know what works with their classes. Do you mean that sort of thing?'* Once a general definition of TK had been established the STs gave a strong indication that accessing their mentor's TK was useful and that this was, in part, already happening as a result of their existing working practices.

> *...It's just having that experience created over years to realise what works when and what doesn't and with which classes...that's kind of really behind the scenes but it's really helpful to know that*.

STs could describe how TK had a role in their learning in school and spoke of mentors who are able to explain what they are doing and why:

> *...Just chatting to them, whether it be in mentor meetings...or after a lesson. At the end she'll be, 'did you notice I did this'. We usually chat for another hour after the lesson about everything she did and why.*

This comment reveals that the mentors' reasoning can be a focus for a lengthy post-lesson discussion.

One ST (April) could recognise that TK, shared by her mentor, could be useful in planning and teaching but explained that the link between what her mentor says and why it is important is not always immediately clear. This point is exemplified in the following quote taken from the focus group:

> *So, even though maybe sometimes you don't really understand why they [mentors] are suggesting something [...] I'm not very sure why they say that's the best way. They [the mentor] usually explain but I don't fully understand and then eventually, maybe like a month later, I realise - oh that was really important.*

4.3.2. Ways to access TK and factors which encourage STs to develop their understanding of TK

The relationship between ST and mentor was recognised as important in accessing TK and this was connected to how far STs trusted the knowledge of mentors:

> *...The fact that I trust their advice, is part of trusting their tacit knowledge, because if they give me advice and I think mm I'm not very sure what's the reasoning behind it. My assumption is that 'you have more experience than I do' so I'm going to try it out.*

The focus group revealed that STs who had mentors who were able to collaboratively reflect upon their teaching, considering how to improve it was an encouraging factor in accessing TK:

...It's really good when ... the teachers are really open about the mistakes they make, during a lesson and they say ' I don't think I did it right actually', 'I should have done it differently..'. As in that particular situation you know there is an alternative way of doing things. So, some teachers are...critiquing their own teaching practices and I find it...reassuring because I understand that everybody's learning, all of the time, so it's really great.

STs discussed the potential of accessing TK through observing teaching, with one ST (Ben) indicating that this could be particularly useful later on in the PGCE course when his contextual understanding had developed:

...Watching more experienced teachers, you'd get more out of it now you know you've got a level of understanding.

This is reflected in the literature as 'simply observing and being observed is unlikely to help a novice make sense of what is going on in complex classrooms' (Wilson, 2013).

Another ST commented on how useful accessing TK could be further into the PGCE:

...At the beginning of the course...doing loads of observations I was just getting a little bit frustrated. If I had an observation now I think that would be really useful to access some of that [TK] *because you know a bit for yourself.*

This suggests the possibilities for learning about TK change as STs develop through their PGCE course, also reflected in Hagger's (1995) study on PCK. Ben's comment (above) highlights the advantage of having some teaching experience when undertaking observations and in trying to access TK. Rebecca, from case study four, also mentioned the importance of knowing the class in supporting her to make the connections between her mentor's teaching actions and TK. In addition to this, 33% of the ST questionnaire

responses mentioned the importance of context. Contextual understanding and 'peripheral participation' (Lave & Wenger 1991:109), where STs are working in collaboration with experienced teachers, can encourage STs to make the link between teaching actions and underlying reasoning. Ben's comment from the focus group suggests that ST experience and understanding of context are both encouraging factors allowing STs to understand TK further; especially when observing in the mid - later stages of a PGCE course.

The focus group data show that STs thought TK played a useful role in their learning and that they were able to identify ways to access their mentors' TK. STs identified working collaboratively, with mentors who were openly reflective about their teaching, as a useful method. The focus group discussion also revealed that observation of mentors' teaching facilitated access to TK. Lastly, the importance of contextual understanding was raised as a factor which encouraged access to TK.

4.4. Chapter summary

In this chapter, case study data have been presented showing STR interviews are able to successfully encourage STs to observe and question their mentors in order to reveal the TK underpinning observed teaching actions. STR interview data show STs in a driving role during the lesson debrief, which resulted in the issues that mattered to the STs being 'unpacked'.

Case study one highlighted that Claire had complex, multilayered decision-making underlying her teaching and that she was able to communicate her TK. This case also

shows the STR interview was successful in accessing Claire's TK, with Will in the position of interviewer being an influential factor in encouraging this access.

Case study two revealed how TK was used by Stephen to respond to changing class dynamics; in this case the need for differentiation. TK was also useful in helping to explain why Stephen had chosen a particular teaching style (here, didactic delivery) to suit the lesson aims. This case highlighted the specificity of Adam's questions as a factor in encouraging access to Stephen's TK with judgemental questioning shown to provoke a defensive response.

Case study three suggested that accessing TK can illuminate seemingly inconsistent teaching decisions for STs; in this case the varied behaviour management techniques Stephen was using. A factor in eliciting TK was the evaluative nature of Stephen's responses as he was prepared to discuss alternative teaching strategies.

Case study four revealed how TK can support ST learning, as Rebecca could recall the importance of non-verbal teaching strategies which had been discussed. Rebecca also spoke of her prior experience of teaching and contextual understanding as encouraging factors in accessing Stacey's TK.

Questionnaire and focus group data highlighted that STs and mentors view TK as useful in teaching and in learning to teach. There was variability over how mentors and STs consider the accessibility of TK. Questionnaire data revealed that mentors could suggest ways for STs to access TK and these were comparable with Eraut's (2000) suggestions. Mentor suggestions similar to those made by Eraut include regular discussion where explanations are expected; the use of mediating objects (e.g. looking through teaching plans) and observation followed by questioning where mentors fully justify their actions.

The STR interview process is an example of this. STs raised the importance of teaching experience and knowing the context as encouraging factors in accessing experienced teachers' TK. In the focus group, the trust between mentor and ST was highlighted as an important factor in encouraging access to TK, as was the ability of mentors to critique their own practice in a collaborative setting alongside STs. The potential for observation and questioning to support access to TK, particularly in the mid–later stages of a PGCE course, was also raised by STs.

This chapter has outlined the main findings from the case studies and other supporting data, analysing the implications and meaning of the data. The next chapter takes this further, discussing the main themes arising out of the combined data which are closely connected to the research questions.

Chapter 5 Discussion

This chapter is structured around the research questions in order to discuss how all of the combined findings relate to these questions. Emerging themes to come out of all data sets are explored including: the relevance of ST and mentor definitions of TK; the importance of learning from experienced teachers; and how access to TK can support STs in clarifying ambiguous teaching observations. The next section looks at how the STR interview process provided an opportunity for STs to uncover their mentors' TK and the centrality of questions within that process. Subsequently, there is a discussion of how mentoring style, discourse object, preparation, timing and context emerged as influential factors.

5.1. The role of tacit knowledge in student teacher learning

5.1.1. Definitions

This section looks at how participants defined TK and what these definitions could infer about the role of TK in teaching and ST learning.

The focus group and questionnaire findings revealed that STs and mentors were able to provide various definitions of TK with many similarities including: knowledge gained by experience, intuitive understanding and embodied knowledge. Findings from the focus group show that once a working definition of TK had been established STs were freely able to discuss how this type of knowledge featured in their experiences in school. The questionnaires provided a possible definition to start with; however, due to the nature of online questionnaires no collaboration over a working definition could be established,

which may have led to increased variety in the definitions offered. STR interviews revealed that STs and mentors understood the meaning of TK as the transcripts show ST questioning which seeks to reveal underlying TK, and mentors explicating the TK guiding their actions.

Ascertaining how STs and mentors define TK was important for my research as this gave an indication of how likely the participants were to discuss this form of knowledge in everyday practice and, as part of the defining process participants were able to suggest whether TK already featured in their school based practice. This gave useful insights into what was possible in terms of research. For example, it was clear that TK was valued by STs and mentors as a source of information and learning and that accessing TK was deemed possible. This led me to believe that STs and mentors would be interested in taking part in interviews which focussed on the explication of TK.

The role of TK was seen as important in teaching, and in learning to teach, by both STs and mentors, suggesting that TK has an important status and is worthy of discussion and research. Differing definitions of TK, given by mentors and STs, suggest that the nature of TK is disagreed on; including how TK is developed, how it is accessed and when it is used. Variability in how prominently TK featured in mentoring discussions also indicates some STs may be less likely to gain access to their mentor's TK. As one ST in the focus group put it, his mentor was more likely to say, 'it [*the lesson] went wrong...just move on'*.

Where mentors define TK as useful in learning to teach and accessible this could increase the likelihood that TK will feature as an object of discussion. The strength of focus upon TK in a ST-mentor relationship may depend upon their individual definitions of TK. Using Simon's (2000) ideas on bounded rationality, where individuals make decisions based upon their cognitive limits, mentors may apply one understanding of TK within their

working practices and STs may apply a different one. This could result in the two 'talking at cross purposes'. It is less likely STs will look to uncover their mentor's TK for teaching use without a clear idea of what it is or how it can support learning. Where there is a shared understanding of the role of TK between mentor and ST it is more likely for TK to feature in the learning process. Uncertainty over TK was not evident throughout the case studies as STs were able to pose appropriate questions aimed at eliciting their mentors' TK. Although it is recognised that the participants were briefed as to what they were looking for and a working definition of TK had already been established.

Considering the importance that STs and mentors gave to the role of TK in the teaching process and in learning to teach, it is worth ensuring a clear definition of what TK is and how it can support ST learning within ITE. Where there is ambiguity over TK it is less likely this will play a significant role (in any explicitly recognised sense) in ST learning.

5.1.2. Learning from experienced teachers

This section discusses how accessing experienced teachers' TK can have a significant role in ST learning and that STs can benefit from this knowledge at different stages of a PGCE.

The STR interviews gave STs the opportunity to access their mentors' TK and in doing so, develop new teaching knowledge. Case study four revealed that knowledge can be learned from STR interviewing as Rebecca was able to discuss several teaching ideas gleaned from her discussion with Stacey (as shown on page 132).

The knowledge recalled by Rebecca supports the idea that TK can play a useful role in ST learning and corresponds with the notion of post-lesson discussions as opportunities to 'examine, alter and construct new knowledge' (Chaliès *et al.* 2004: 765*).* During the

interview Rebecca was able to discuss what she had learned through the observation and discussion process, providing evidence that these ideas had been embedded into her conceptual framework of teaching understanding. Knowledge gathered in this way could become useful for Rebecca in her own subsequent planning and teaching.

As teaching experience increases, TK plays a bigger role in classroom practice and teachers are more able to make intuitive judgements (Dreyfus, 2004). At the start of a PGCE most STs have very little classroom experience and therefore little relevant TK to draw upon. There is a difference between the role of TK (owned and used by the ST) and the role of TK owned by the mentor and accessed by the ST. One ST in the questionnaires commented that '*as experience increases, I don't have to think about the type of questions I'm asking'*, illustrating an increase in personal TK. However, at the start of learning to teach the role of (accessing) TK via STR interviewing could support further understanding of observable teaching actions at a time when STs intuitive judgements are not developed. Accessing mentors' TK, shown to be possible through the case studies, would be a useful process to enhance early observation which has been said to be '*frustrating'* and *'boring*'.

TK can play a role in exposing the 'taken for granted' knowledge, which mentors may overlook in their discussions with STs. At the start of a PGCE STs have little prior experience and this can make deciphering classroom teaching challenging. Meaningful learning occurs where new information is incorporated into an already existing framework (Vygotsky, 1978; Beyerbach, 1988) and at the early stages of learning to teach it is the lack of classroom experience (and therefore lack of conceptual framework of practical teaching) which may result in STs struggling to gather meaningful learning from observation of experienced teachers. STs may not be sure of what questions to ask and

mentors may struggle to pitch their explanations at the right level. Where 'novices do not know what there is to be learned, nor how they can learn it; experienced teachers take their tacit, intuitive expertise for granted' (Hagger and McIntyre, 2006:78). Therefore, in order to enlighten STs as to what is happening 'under the surface' of classroom observations (these being more frequent at the start of learning to teach), mentors' TK could have a significant role. Insight into mentors' TK can prevent STs from mindlessly imitating or from misinterpreting their mentors' lessons (Zanting *et al.* 1998: 18) as discussed in Chapter Two. The process of STR interviewing has been shown to make TK available as an explicit source of knowledge (see Table 4.2 on page 135-7 for examples) and can support STs to get 'under the surface' of classroom teaching.

5.1.3. Clarifying ambiguity

Throughout the four case studies in my research, TK was accessed by ST questioning. This questioning often sought to clarify seemingly contradictory or confusing teaching actions. STs in the questionnaire pointed to *'asking [mentors] to justify why they have made certain decisions within the classroom'* as useful and the case studies show STs asking such questions directly.

It was clear through the case studies that the STs were not always sure why their mentor had acted in particular ways. This was illustrated in case study three where Laura (ST) questioned seemingly inconsistent behaviour management decisions that had been made during the observed teaching. Laura asked questions which sought to uncover why her

mentor had responded to pupil behaviours differently at different times. Reasons were elaborated as Stephen explained why his responses varied (see page 126 for details).

Interaction between Stephen and Laura exemplified how the role of TK can be to elucidate seemingly contradictory teaching procedure. For STs there can be perceptual confusion about when to enact certain types of response to different classroom scenarios. STs need support to 'develop a repertoire of problem solving strategies for dealing with the practicalities and complexities associated with contextual school' (Hudson, 2012:72). Providing this type of support is said to be challenging for mentors (Wang, Odell and Schwille, 2008). However, in case study three, Stephen's varied approaches to pupil behaviour were explored through dialogue with Laura, who was able to uncover the reasoning behind what was observed in the classroom. TK accessed through the STR interviews played a useful role in developing a more sophisticated understanding, for Laura, that teaching and learning is not a set of technical instructions or responses which can be reliably repeated in predetermined classroom situations.

Progression in the ability to understand complexity is elaborated in Dreyfus' (2004) model of skill acquisition (Figure 5.1 on page 161), which shows an increasing use of TK as an individual becomes more proficient in their professional work. As experience develops, a teacher will be able to use an intuitive grasp of situations based upon deep tacit understanding, will have a vision of what is possible and will be able to prioritise factors in a decision-making process (*ibid.*). The use of TK gradually increases (over time and with experience) as too many considerations, to deliberate over explicitly, accumulate. A novice (here, a ST) has less ability to see situations holistically and situational perception is more limited, in line with Dreyfus' level one. Accessing experienced teachers' TK can

develop greater understanding of complex classroom situations. Understanding of this nature may not happen immediately and may be gradual, as identified by a member of the focus group (see page 151 for more details).

Level 1 Novice
Rigid adherence to taught rules or plans
Little situational perception
No discretionary judgment

Level 2 Advanced Beginner
Situational perception still limited
All aspects are treated separately and given equal importance

Level 3 Competent
Coping with crowdedness
Conscious deliberate planning
Standardised and routinised procedures

Level 4 Proficient
See situations holistically rather than in terms of aspects
See what is most important in a situation
Perceives deviations from the normal pattern
Decision-making less laboured

Level 5 Expert
No longer relies on rules, guidelines or maxims
Intuitive grasp of situations based on deep tacit understanding
Analytic approaches used only in novel situations
Vision of what is possible

Figure 5.1. Summary of Dreyfus' model of skill acquisition (Dreyfus, 2004)

In contrast with a more basic level of understanding, acknowledged by the STs in the focus group discussion, Stephen (in interview two) revealed his more advanced skill level and use of TK (characteristic of Dreyfus' skills level 4 and 5) as he reflected upon his use of praise within the lesson. Stephen recognised he had an intuitive grasp over varying the type of praise he was giving; acknowledging when it is important to change the 'evidence' as he called it; highlighting the need to deviate from generic praise to a more effusive form. Stephen called this need for varying the type of praise '*obvious'*; however, Laura initiated the questions which were asking about his use of voice when giving out praise. It

is exactly this gap from novice to expert as outlined in Dreyfus' model of skill acquisition, which can be recognised and bridged through STR interviewing; giving STs the opportunity to see how the journey towards the next level could begin. The 'obvious' needs illuminating for STs and Tomlinson (1998: 34) supports this idea, asserting that experienced teachers use everyday sounding expressions like 'group-work' but mean complex sets of things. When functioning as mentors, they need to 'explain these taken for granted aspects to the student novices for whom such meanings are not yet familiar'. Identifying and explicitly discussing the TK that informs a mentor's practice is one mechanism of achieving this level of explanation.

My research has shown that STs value the opportunity to listen to mentors' reasoning and the STR interviewing raised the profile of teaching issues, which some mentors may have considered obvious. Accessing TK through STR interviewing is one method that encouraged mentors to talk at a level which was tailored to the STs' development.

5.2. Ways in which student teachers can access tacit knowledge from their mentors

5.2.1. The stimulated recall interview as a learning method

Two points emerge through all four case studies with regard to the STR interviewing. The first is that the shared teaching experience facilitating the stimulated recall aspect of the interview was successful in pinpointing particular teaching episodes, leading mentors to reveal what they had been thinking at those specific times. The second is that having the ST in the position of interviewer provided a different dynamic compared to a more usual mentor-ST debrief, which may have contributed to the successful explication of the

mentors' TK. The active questioning from the ST may also have led to a reduction in descriptive or judgemental feedback (discussed further in section 5.3.1).

As part of the STR interview process, the lesson observation was a useful starting point to anchor specific questions, which led to a high level of recall (Bloom, 1953) and mentors could reveal what they were thinking in situ during the teaching episode. Having jointly experienced the lesson (one teaching, the other observing), there was great clarity over what was being discussed (e.g. an action, statement or pupil behaviour). If the aim of a mentoring discussion is to focus on TK, the case studies have shown that observation is an important element in identifying specific teaching actions, enabling mentors to recall the teaching knowledge which was used at the time.

Mentors are often in the position of providing feedback on STs' teaching and the STR interviews reversed this; instead encouraging the mentor to provide justification for his/her own teaching. Here, the STs were steering the discussion according to what they considered interesting or important, and as mentors are likely to take their own knowledge for granted (Hagger and McIntyre, 2006) they may not be best placed to know what information to offer. My research suggests that when STs are in a leading position in a two way discussion, teaching matters which may otherwise be superficially passed over can be a point of focus.

In addition to accessing TK, shared observation and putting the ST in a questioning role proved to be a strategy which enabled shared reflection and an opportunity for professional learning, both identified in the literature as 'notable by their absence' (Hobson *et al.*, 2009:213).

My research supports others (Ethel and McMeniman, 2000; Bertone *et al.* 2006; Gass and Mackey, 2007) in establishing that that TK can be made explicit through STR interviewing. TK was seen to be useful for ST learning in my research, by both STs and mentors, and this has also been identified by others previously (Schön, 1983; Fenstermacher, 1994; Toom, 2006 & 2012; Dudley, 2013). This prompts the question: is the explication of TK within ITE understood and prioritised sufficiently?

5.2.2. Questions

Questions played a significant role in accessing TK and in the analysis of data different types of questions were apparent. For example, questions aimed at clarifying ambiguity and questions which contained STs guessing mentors' reasoning. Questions were at the heart of the STR interview process and it is recognised that accessing TK through questioning is possible (Eraut, 2000 and Westera, 2001). Questions were highlighted as an important method for accessing mentors' TK, by mentors themselves (see page 149), although less so by STs. Throughout the STR interviews, questions aimed at uncovering tacit teaching knowledge totalled between 10 and 15 per interview. Questions asked by STs were frequently structured around an episode of classroom teaching which had been observed, followed by a question which required some kind of reasoning behind the teacher's decision/action. My research highlights the importance of encouraging STs to actively ask questions as the STR interviews revealed that putting them in the position of interviewer encouraged TK to come to the fore. This encouragement is particularly important as 'asking questions' was not cited by STs as often as mentors (throughout the questionnaire data) when asked to suggest ways to access TK.

Buitink (2009:125) suggests that there are 'active' STs and 'passive' STs. Those who take on a passive approach to their learning will rely on external factors in promoting their development as teachers. External factors (e.g. PGCE sessions and mentors' feedback) are available to all; however, the difference being those STs who are active in their learning will ask questions, of themselves and others, seek out particular opportunities and create longer term development plans. The STR interviews promoted an active stance to ST development with the questions being driven by the STs themselves. The questions, which were guided by the requirement to uncover the mentors' TK were crucial in directing the flow of conversation. The STs were autonomous in deciding what questions to ask and which teaching aspects they felt it would be useful to know more about. Carr and Kemmis (1986: 156) refer to higher-level reflection as involving teachers as the central actors 'in transforming education' and, here, in the STR interviewing, STs were the central actors in transforming their own understanding; agents of their own learning, asking questions that mattered to them. An approach which builds upon the concerns of the ST rather than 'a pre conceived idea of what a [student] teacher should learn' (Korthagen, 2015: 13) could encourage STs to ask the kinds of questions which matter to them. My research indicates that giving STs responsibility over constructing questions and leading post-lesson discussion allows TK to be revealed. An implication of this is for mentors to recognise the importance of post-lesson discussion where they are able to allow STs to take a leading role in asking questions and also willing to be candid about their own TK in practice.

5.3. Factors which encourage student teachers to develop their understanding of tacit knowledge for teaching use.

5.3.1. Mentoring style

Mentoring can be placed on a 'dimension of directiveness' (Harrison et al., 2005: 175), with a non-directive style at one end and a directive style at the other. Where mentors take a very directive style there will be less opportunity for STs to question and to express their own views, instead there will be more instruction and advice from the mentor. A non-directional style is a more flexible approach, one which encourages reflection (Crasborn et al., 2008) and includes 'guiding to develop alternatives' (Harrison, 2005: 174); similar to guided participation (Rogoff, 1995). Through the case studies in my research it is evident that the STR interviews generated discussion which was reflective, explanatory and focussed on the mentors' teaching and decision-making. Knowledge about teaching possibilities was made available in a non-critical, non-corrective way. The STs were not the focus of judgement; it was the mentor's teaching and their decision-making being examined. The STR interview data reveal that where the focus was on the STs actively questioning and seeking to uncover reasoning from their mentors, the conversations were more non-directive, in Harrison *et al*'s (2005) terms, as the STs were central in asking the questions.

Research literature shows that mentoring conversations can focus heavily on classroom practicalities and advice, which is often given with little explanation or agreement on how to proceed further (Edwards and Protheroe, 2004; Hennissen *et al.,* 2008). By placing STs in the position of interviewer, the scenario of an evaluation of teaching with the mentor

posing questions, offering assessments and suggesting improvements is altered. STR interviews encouraged STs to take an active role in a collaborative discussion rather than being on the receiving end of a more critical or judgemental evaluation of their own practice.

Mentoring characteristics were discussed in the focus group and one ST stated that mentors who were able '*to be open about their teaching mistakes'*, are useful in revealing TK as it became clear that '*in a particular situation there are alternate ways of doing [things]'*. This was said to be really useful as it reassured her that, '*everybody's learning all the time'*. Another ST in the focus group had a different experience, with his colleagues not being so open or reflective about what happens in observed lessons. One ST had a mentor who would not actually explain why lessons 'went wrong', instead the mentor would rather forget and just move on to the next lesson. The focus group data reinforces the data from the STR interviews suggesting that mentors who are able to reflect upon their classroom decision-making and discuss alternatives will encourage STs to develop their understanding of TK. Further correspondence on this point is available within the questionnaire data, where one ST confirmed that speaking to mentors about why they choose to do things in particular ways gives *'valuable insight into alternative teaching tactics'.*

My research suggests STR interviewing could be an influential factor in encouraging mentors to collaborate with STs and disclose their TK. The different conceptualisations of mentoring 'enable and constrain different ways of regarding and interacting with [STs]' (Kemmis *et al.*, 2014:156). For example, mentoring can be construed as 'supervisory', as 'professional support', or as 'collaborative self-development' (*ibid.)* and depending on the conceptualisation assumed, a two-way, evaluative conversation about a mentor's own

teaching will be more or less likely. The STR interview supported a disposition which encouraged collaborative reflection upon action; reducing issues of compliance or supervisory judgement noted as problematic by Hobson *et al*. (2009). STR interviewing could influence the way in which mentoring is practiced and the way mentoring is practiced is said to 'reproduce and transform [...] both mentor and mentee [ST]' (*ibid.:*157). For example, where mentoring is seen as supervisory, a mentor is likely to be seen as the supervisor and the ST is likely to develop the disposition of compliance. Different versions of mentoring produce different learning for STs and the STR interviews were effective in transforming TK held by the mentor into explicit knowledge, shared with the ST. STR interviews could encourage a potentiating learning environment (Claxton & Carr, 2004) where collaborative self-development, involving professional growth through collegial mentoring prevails (Kemmis *et al.,* 2014*)*.

My research confirms it is essential that all ST mentors should not only be aware of the need for a reflective and open approach but should have access to pedagogical strategies in order to achieve this; possibly requiring a change to mentor training and 'practice architectures' (Kemmis, 2014: 163).

In summary, information collected via all three data collection tools suggest that where STs were in an active position, able to question their mentors about teaching and where mentors were open to self-reflection, accessing TK was encouraged. There are many factors involved in developing a mentoring style and this will always be highly individualised. My research does provide evidence that STR interviewing is one way to enable STs to be active; in the position of investigator. With the ST in this position the likelihood that a post lesson discussion will focus on generalised advice or judgemental

remarks from mentors is reduced; instead the ST is at the centre of their learning, asking the questions that matter to them.

My research shows that where STs are encouraged to take on an active role and where mentors are able to openly discuss their knowledge in action, TK can be successfully revealed. In order to encourage a mentoring architecture (Kemmis *et al.*, 2014) where these characteristics are nurtured there is a need for:

- access to experienced teachers' expertise to be seen as essential;
- ITE to establish and promote strategies for uncovering TK (which may otherwise be left as inaccessible) and;
- STs to be seen as determinants of their own learning, expected to create and ask purposeful and relevant questions based upon real experiences.

5.3.2. Discourse object

Discourse object is another potential factor which could encourage STs to develop their understanding of TK. Discourse object refers to the overall purpose or 'object' of a conversation, according to the individuals involved. There are many possible 'objects' within a mentoring conversation and these are based upon what each individual involved sees as the motivation for the interaction; what it is directed towards. For mentors, motivation could be getting pupils through the curriculum (Edwards and Protheroe, 2004), or they may subconsciously stick to offering advice (Crasborn et al., 2008). Research has shown mentoring conversations can focus upon 'polishing visible performance' rather than encouraging STs to think about pupil learning (Edwards and Protheroe, 2003: 230). STs may be primarily concerned with 'seeking approval through

compliance' (Bertone 2006: 246) and are keen to partake in the 'doxa' or ordinary vision (Bourdieu, 1999: 339). Mentors and STs are constantly interpreting the symbolic meaning of their environment (including the actions of others) and they will act upon the basis of this imputed meaning (Bryman, 2008).

Cultural historical activity theory supports the idea that situated, contextual understanding is influential, that activity has an objective; it is object-oriented (Engeström, 1987). Thus, the nature and content of a mentoring conversation will be influenced by the underlying object (or ambition) assumed by each participant. Hence it is worth considering if my research data reveals information about how STs and mentors view the object of study (TK).

My research was limited in terms of the number of participants, so generalisations beyond the particular contexts cannot be made. However, all of the data collected support the idea that both STs and mentors see TK as useful in the process of teaching and in learning to teach. One hundred per cent of STs and mentors regarded TK as very useful in the teaching process. One hundred per cent of mentors and STs thought that TK was very or potentially useful in learning to teach. STs in the focus group discussion gave examples of how they accessed their mentors' TK and how it was useful to their growing understanding of teaching. The interview data reveal mentors reflecting upon their teaching and sharing TK with the STs. These agreements between data sets over the usefulness of TK indicate that STs and mentors both recognise the value of TK in their work and professional development. Where STs and mentors recognise the role of TK in the learning to teach process, this is an encouraging sign that TK could be a legitimate 'object' of conversation, providing confidence in the interview data as a valid source of data focussed upon the key issue under study: TK.

Another factor to consider is whether or not those involved believe this type of knowledge to be accessible. One hundred per cent of mentors questioned thought that it was possible for STs to access their [the mentors'] TK. The notion that the way in which we 'interpret a task or problem will shape the way we respond to it' (Edwards and Apostolov, 2007: 72) corresponds with whether or not mentors recognise the possibility of unveiling their TK in a mentoring capacity. Mentoring conversations eliciting TK are much more likely to take place where this type of knowledge is interpreted as both useful and accessible. My research shows full agreement from a small group of STs and mentors that TK is useful and the STR interview data reveal that TK is accessible; accessed throughout all four interviews.

Interview data show that where the STs asked clear questions aiming to access underlying reasoning for observed actions, the mentors were able to reveal TK and remained focussed on the STs question. This often led to a level of teaching justification being revealed which was otherwise unavailable to the ST at the time of observation; advancing their understanding. This points to the need for all STs and mentors to be aware of the value of TK as a learning tool and, therefore, a useful object of (focus for) discussion.

In order for STs and mentors to develop a shared discourse object, including developing a working definition of TK, another important factor to consider is the preparation of STs and mentors prior to undertaking a STR interview procedure. This is discussed in the next section.

5.3.3. Preparation and timing

How much responsibility STs take on board for ascertaining information which may be of use to them varies, and is an issue which has previously been highlighted (Hagger and McIntyre, 2006; Buitink, 2009). Preparing STs to question their mentors effectively is seen as very influential and said to be an area where more 'persuasive guidance about the kinds of probing [that] can give access to richer information about teachers' craft knowledge seems to be needed' (Hagger and McIntyre, 2006: 204).

My research preparation for the STR interviews involved STs and mentors being briefed in person and provided with participant information about the research, which confirmed the purpose of the interviews and the requirements involved in taking part. The STR interview method was not a regular feature of the PGCE and therefore preparation was necessary for both ethical and methodological reasons. The purpose of the STR interview was clearly defined as an opportunity to uncover the mentor's TK; also expressed as the reasons and thinking informing the decisions made in the observed lesson. ST questions largely focussed around specific incidents, including a quantity of recounting events, and mentors were encouraged to reveal their reasoning. It can be surmised that as a result of this preparation the STs posed questions about specific teaching incidents which sought to reveal the mentors' TK in action.

STs were in an active role as they initiated questions, directed the interviews, and selected the pedagogical issues/events for discussion. On page 136 there are examples of ST questions which were asked during the interviews. These examples show the STs were able to construct appropriate questions, designed to explicate TK, and that the questions were relevant to the observed lessons and the STs own interest.

In the early stages of ITE it is common practice for STs to carry out a significant amount of lesson observation; watching experienced teachers teach in order to get some ideas of how to manage whole class learning in their chosen subject. STs are said to be 'unlikely to access the craft knowledge of experienced teachers through observation' (Hagger, 1995; 27) and with craft knowledge seen in my research as closely linked with TK, this suggests that improvement of observation practice was needed in 1995. The focus group data from my research revealed observation as '*boring*' and *'frustrating'*, implying improvement is still needed. Therefore, it is worth questioning the use of observation in ITE, a practice which is still commonplace, and identifying ways in which this practice could be made more effective; potentially through better ST preparation.

As time on an ITE course continues, so the training needs of a ST will change and this change should be reflected in the opportunities and support offered by a mentor. This point was raised in Chapter Two, with Hagger (1995) and Hobson *et al.* (2009) asking for support which takes into account the stage of ST development, and also listening to STs when they have ideas about what is relevant to them at different stages of a PGCE year. More recently, Korthagen (2015: 5) has highlighted the need for a personal approach with the dimensions of thinking, feeling and wanting as key considerations in ST learning, suggesting that 'attempts at influencing teacher behaviour have to be adjusted to individual teachers in their specific circumstances and settings'. Therefore, it follows that an individual approach to preparing STs for observation and discussion with their mentors would be beneficial, taking into consideration the stage of the course, development needs and the personal and affective dimension.

My research is limited in the extent to which it can make claims over how accessible TK is at different stages of a PGCE course as the research was not carried out as a longitudinal

study. However, comments gathered from the STs suggest that they can see the benefit of observing and questioning their mentors about TK as their experience develops. There is a difference between STs accessing TK through STR interviewing and STs understanding their mentor's TK in use as a result of familiarity with contexts and classes. Familiarity may enable STs to 'see' the links more clearly between visible actions and TK. Further work into how the preparation of STs and how the timing of observation may affect access to TK would be worthwhile in order to inform appropriate ITE planning.

5.3.4. Contextual factors

Contextual factors affecting the elicitation of TK were raised throughout all data sets with comments relating to the benefits of knowing the class and having had previous teaching experience. These factors were seen as useful in accessing the TK guiding the mentors' teaching. This appreciation of context was shown to be an important factor in enabling STs to understand why their mentors were proceeding in particular ways. From this finding it suggests that as a ST gathers more awareness of the system (e.g. school structures, culture, pupils and classroom environment) it becomes more likely he/she will be able to link teacher behaviour to intended outcomes. These contextual factors, which drive and inform teachers' TK, are recognised by others. Toom (2012: 629) notes, *'*one must have the ability to choose the relevant knowledge and skills in a specific context'.

STs recognised the relevance of context as a factor in being able to access and understand their mentor's TK. The importance of getting to know a class was identified as a factor in linking together what the class teacher was doing or saying and what they were trying to achieve for each individual.

Having the opportunity to share classroom experience with a mentor provides the ST not only with context, but also with a useful resource to pinpoint specific pedagogical moments, and then to delve deeper into the experienced teacher's reasoning. With the opportunity to build a shared contextual vocabulary (from shared classroom experience) this can encourage access to the TK in use at the time of teaching; increasing the likelihood the ST will understand the lesson experience more fully.

Teacher learning is said to be 'shaped through a combination of reciprocity between the context of the particular school setting' (Wilson and Demetriou, 2007: 214) and therefore it is beneficial for STs to immerse themselves within a context and be able to learn from an experienced other within that same context. Accessing mentors' TK is enhanced when STs can see and understand the pupils' actions (and reactions) and where they are part of the social structure of which they are learning about. This reinforces the arguments for STs to learn through collaborative working (Beauchamp, 2015; Buitink, 2009; Kemmis *et al.*, 2014) in shared contexts (Lave and Wenger, 1991; Edwards and Protheroe, 2003; Wilson, 2013).

5.4. Chapter summary

This chapter has highlighted that mentors and STs recognised TK as important in practice and in learning to teach; and that post lesson discussions were an opportunity to construct new knowledge for STs. The STR interview as a strategy for STs to interrogate the obvious, which may otherwise be overlooked by mentors, has been raised; including the active role the STs played in the process. Also covered was the developmental nature of the conversations reducing the presence of judgemental feedback; both enhanced by

relevant preparation information (prior to the interviewing) and a contextual understanding of the school settings.

Chapter 6 Conclusions

This chapter considers the main points which have been learned from my data in relation to the research questions. Firstly, the findings that contribute to the knowledge base of TK and ST learning are outlined, followed by the implications of these findings for policy and practice within ITE, including suggestions to take forward. A reflection on the methodological process and the validity of the study is then covered. Finally, the potential for sharing my research findings is discussed along with proposed avenues of research which could build upon the understanding of TK within ITE further.

6.1. What has been learned?

This section links to what has been found and makes conclusions on the original research questions.

What is the role of tacit knowledge in student teacher learning?

The use of TK can make a real impact on ST learning, not only at an early stage where teaching observations could be further enhanced by accessing the TK informing all that can be seen, but also as STs develop their own classroom experience. In my research classroom experience and STR interviewing has been said and shown to help STs make connections; to map out conceptually what knowledge experienced teachers are utilising as they are in the process of teaching.

Experienced teachers are not thinking about the basics of practice or deliberating over all immediate teaching considerations anymore, whereas STs are, and in order to pick apart the skilful practice of an experienced teacher, it is useful to break down elements of

teaching and to identify the decision-making behind fast flowing, routinised actions. Accessing TK has a significant role in achieving this.

In my research, tacit teaching knowledge was revealed via deliberative questioning and enabled the STs to access the 'minds not only the observable behaviours' of the mentors involved (Ethel and McMeniman, 2000:87). This questioning allowed meaning-oriented reflection (Hoekstra *et al.*, 2007) rather than the more traditional action-oriented with the former being 'oriented toward understanding under-lying processes' (Mansvelder-Longayroux, Beijaard, & Verloop, 2007: 57). Where action-orientated reflection seeks short-term solutions, meaning-orientated reflection encourages ST understanding of a particular situation.

Accessing the TK of mentors was shown to inform the STs' teaching knowledge base and encouraged a 'why-centred' discussion around reasoning and decision-making, rather than a 'what-centred' discussion, focussed on practicalities and process [both types of discussion have their place in school experience].

What are the ways in which STs can access tacit knowledge from their mentor or more experienced colleagues?

STR interviews were shown to allow STs to access the TK of their mentors. TK was accessed through ST-led questioning and all four case studies revealed elements of TK being accessed through the interviews.

STs were able to take on an active role in the process and the STR interviews prompted mentors to unpack their knowledge in use centred on specific incidents which may have otherwise been left undisclosed (or taken for granted). My research has shown that

appropriate preparation for observation and interviewing resulted in a focussed discussion, which allowed STs to access the TK of their mentors. This is an improvement to some observational experiences of STs which can be ineffective for furthering their understanding of teaching. Further guidance on the preparation for and timing of STR interviews has been raised as an issue for investigation including the types of questions STs should be asking in order to successfully elicit the TK of their mentors.

What factors encourage STs to develop their understanding of tacit knowledge for teaching use?

STs played a leading role in the interviewing process and were, consequently, choosing the topics raised for discussion. The observed teaching, which the mentor had carried out, was a key element in the grounded and contextualised nature of the conversations held. A divergence away from a more directive (Crasborn *et al.* 2011) mentor-ST conversation, focussed upon descriptive and procedural elements (Edwards and Protheroe, 2004), meant that ST questions prompted more explanatory responses. Whilst STs questioning their mentors may be commonplace, it was the ST in the role as interviewer and the focus on explicating TK, which reduced generalised description or 'judgementoring' (Hobson and Malderez, 2013:89).

The switching of traditional roles was a key factor in encouraging STs to access TK and indicated other benefits as well, including promoting the growth of 'active' STs (Buitink, 2009); active in their own learning, and fostering mentoring as collaborative self-development (Kemmis *et al.*, 2014).

6.2. Implications and suggestions for policy and practice

TK is useful and accessible to STs

My research echoes that of others (Hagger, 1995; Ethel and McMeniman, 2000; Eraut, 2004; Toom, 2012; Dudley, 2013) in that TK has been shown to be accessible and valuable for ST learning. Grant (1996: 111) asserts that, 'if tacit knowledge cannot be codified and can only be observed through its application and acquired through practice, its transfer between people is slow, costly, and uncertain'. Valuable teaching knowledge, which may have been taken for granted and undisclosed by mentors, was revealed and explained; benefitting STs and their growing understanding of classroom teaching. Accessing TK was shown to clarify ambiguous (according to STs) teaching strategies. My research findings show that TK can be codified (collected/externalised) and, in Grant's (*ibid.)* terms, this means that such knowledge can be integrated and shared.

It is apparent from the conclusions of my research that STs are able to elicit the TK from their school based mentors in a way which encourages an active and vested approach; and that which leads to the unveiling of useful embedded knowledge. Firstly, the role of TK in learning to teach has been highlighted as one which still demands more consideration and influence within ITE programmes and, secondly, the strengthening of STs as agents of their own learning is something which teacher educators could further support and encourage through the use of STR interviewing. The importance of my research to teacher educators' practice is well summarised as follows:

> *If teaching is to be regarded as more than achieving competence in the delivery of tips, tricks and procedures; if teaching is to be understood as complex, interconnected, dynamic and holistic; and, if teaching about teaching is to make all*

> *of this apparent, then teacher educators need to develop ways of making the tacit explicit* (Loughran, 2013: 62).

Suggestion one: A working definition of TK and the potential for accessing it should be integral to ITE courses.

Suggestion two: STR interviewing should be a recognised method of ST learning. STs should be educated as to the benefits of using this type of interview as part of their developing practice. The efficacy of STR interviewing would depend upon the individuals involved, including the teaching capabilities of the mentor, the quality of ST questioning and the time both parties designated to the process. Help and guidance is needed in the preparation for STR interviewing including the following:

- The requirement to observe an experienced teacher with a focus on uncovering TK
- A stimulus to aid recall and post-lesson questioning (e.g. note-taking or video)
- Talking to the relevant teacher within 48 hours after an observation
- Advice on the purpose and types of questions to use

<u>Mentor practices should encourage STs to be central and proactive in their own learning</u>

When STs begin to regard their classroom activity solely as the object of evaluation by mentors and not as an opportunity to explore and inquire into practice, this perception inevitably leads to a significant shift in STs' goals; they become less concerned with learning their profession through the help of an experienced mentor and more focussed on seeking approval. My research has encouraged discussions focussed upon STs developing their understanding of teaching. As part of the research process the STs and

mentors were given direction as to the purpose of the STR interview and the resultant conversations were explanatory and inquisitive.

As highlighted in Chapter Two, various authors have investigated mentoring style including supervisory behaviour (Hennissen *et al.,* 2010), 'directiveness' (Crasborn *et al.* 2011: 321) and primary foci for mentoring discussions (Edwards and Protheroe, 2004). The process of accessing TK via STR interviewing, led by the ST, has revealed that mentors can take part in developmental conversations about teaching which do not rely upon them directing, leading, judging, assessing or transmitting generalised advice.

Suggestion three: STR interviewing should be a recognised mentoring strategy. The education of mentors should include the benefits of making their TK explicit to STs, including the methods by which this is possible; including STR interviewing. ITE providers are pivotal in recognising the potential of explicating mentors' TK, and both HEIs and schools could place an emphasis on STR interviewing as a method for promoting STs self-efficacy, as active in their own learning and for constructing new teaching knowledge.

Observing experienced teachers and asking questions retains purpose and value

The value of accessing experienced teachers' TK was seen to be as important five months into the PGCE as that which was accessed during early first observations. STs were keen to observe and discuss their mentors' teaching when they had gathered some classroom experience of their own. The ability for STs to make the connections between classroom teaching and the TK informing the teaching was seen to increase as time went on. As a method of accessing experienced teachers' TK, STR interviewing could be effectively utilised to develop greater understanding as time on a PGCE course develops. Observing

experienced teachers is often seen as an 'early days' enterprise which gives way in favour of an increased amount of ST classroom teaching. The STR interviews undertaken in my research, five months into a PGCE course, revealed the process was useful in accessing TK, developing understanding and promoting collaborative self-development.

The usefulness of accessing TK through STR interviewing does not diminish after the first few months of teaching. Although outside the realms of the research questions, this point also has applicability for beginning teachers, in their first years of teaching. Where beginning teachers are treated 'as expert from their first day on the job' and where schools 'maintain norms of autonomy and isolation that limit new teachers' access to colleagues' expertise' (Birkeland & Feiman-Nemser, 2012: 111) the role of TK and the method of STR interviewing could provide further learning opportunities for beginning teachers.

Suggestion four: Accessing TK via STR interviewing should be seen as a mentoring strategy which can be flexibly developed throughout the course of a PGCE and beyond.

6.3. Reflections

The four case studies covered in this research involved seven participants who all gave their time willingly and entered into the interview procedure with an open-minded and enthusiastic approach. The resulting data proved that preparing the STs and mentors had been worthwhile as the content of the interviews remained focused upon the mentors' teaching and the TK in use at the time of teaching. Maintaining a focus on eliciting TK through the interviews was an area of concern for me initially as I was not going to be

present during the interviews and I wondered if the research focus would be forgotten. In the eventuality I thought the interviews went particularly well. The interview data were highly focussed, relevant and applicable to my research questions. I also believe the process was of educational value to the participants themselves, which was an ethical concern in the planning stages.

The interviews did have limitations. The necessity of ensuring ethical responsibility for the participants involved resulted in a small group of voluntary and self selected STs and mentors taking part in the STR interviews. This self selected sample may have led to possible bias within the data collected and is, therefore, limited in scope and applicability on a wider scale. On reflection, to have asked the participants to carry out more STR interviews over a period of months would have been an improvement to the research methodology. This could have enabled me to evaluate the STR interview process more fully and to have looked at possible refinements in more detail. A series of STR interviews over a period of months could also have provided opportunity for a longitudinal study to see if, for example, STs and mentors became more familiar with the strategy and if changes occurred over time.

Interview four was held in a different manner to that of the other interviews due to the post lesson discussion not having been recorded. Having initially seen this as a weakness in the research I came to view the content of Rebecca's interview (with me) as insightful in other ways. This interview revealed information about the content of the discussion previously held between Rebecca (ST) and Stacey (mentor). It also revealed what Rebecca had learned from the experience. Interview four shows proof of learning and of new knowledge having been acquired, through Rebecca observing and then questioning her mentor about her TK. Having assimilated this new knowledge Rebecca was able to

discuss this in interview and use this understanding to explain what she had taken away from the experience.

The questionnaire data collected were also limited in scope due to the quantity of responses gained. With mentors and STs responding in small numbers (nine and six respectively) the validity of conclusions which could be gathered from the data was negligible. The more open, qualitative responses gained through the questionnaires did add a useful element of opinion and did provide extra detail. Looking at the questionnaire data collection process respectively it would have been an improvement to have widened the participation to all of the STs and mentors on the PGCE course. This could have given me far more data to base conclusions and further lines of enquiry on.

I have tried hard to present the realities portrayed by the participants themselves and I have inferred ideas from the data that I believe would be justifiable to others. This process has involved ensuring quotations have remained true to their context and the scale or importance of data has been proportional and not over emphasised or exaggerated. This being said, I recognise that in writing up the research I have presented only one reality portrayed through my own vocabulary (Schostak, 2002). Were I to do this research, or similar, again I would plan and ask for respondent validation at the end of the research writing process, in order to see if there have been significant errors of judgement or understanding. I would also aim to increase the scale of the study and have an increased sample size, providing more case studies, which would enable further corroboration across data strengthening the validity of analysis and conclusions.

6.4. Dissemination of findings and further research

My research has revealed that STR interviews, led by STs, can reveal TK which may be otherwise inaccessible or ignored. Mentors were drawn into conversations which allowed the TK guiding their teaching to be openly discussed. STs' understanding of teaching issues such as behaviour management, the setting of homework, differentiation and the use of questioning was developed. I believe these findings would be interesting and useful to others. My research findings have already been shared at university seminars and at a conference of geography teacher educators in 2015. After a university PGCE seminar in 2017, attended by geography mentors, there was further interest in following up the STR interview method as a learning strategy. In particular, mentors wanted to focus on the potential benefits of making TK more transparent and also re-positioning STs in post –lesson discussions. Mentors were keen to trial the STR interview approach within one-to-one sessions in which they felt they often took the dominant lead, and one mentor commented that he thought STR interviewing could 'improve the usefulness of ST observation', (personal communication with mentor, 2017). Subsequently the STR interview method as a way to re-position STs and to focus on the elicitation of TK has been taken forward in three different schools. The potential for further STR interviewing to be incorporated within the PGCE course as part of regular ST practice has been discussed at PGCE course level and will be reviewed on the basis of the subsequent mentor involvement in the three different schools.

Wider circulation is possible through journals such as 'Teaching and Teacher Education', which is for all concerned with teaching; and the 'Oxford Review of Education' which has the aim of publishing articles which are of interest and utility to the wider public, including policy makers.

Whilst my findings show a development in ST understanding of experienced teachers' teaching, my research did not discover if/how STs went on to use the explicated TK in their own practice. The value of the contributions of the participants to the STR process was under-explored. This was because it was beyond the time resource and scope of my EdD research. In order to discover what happened after the STR interviews, follow up lines of research enquiry are suggested as follows:

1. It would be useful to find out ST and mentor perspectives regarding the process itself and if/how and to what extent the knowledge gained from the STR interviews proved useful in subsequent teaching. This could be carried out using follow up interviews (to gain the insight of STs and mentors) to build a picture of how useful and productive they felt the procedure to be.

Feedback on the procedure would be useful in order to make comparisons between STR interviewing and more commonly used mentoring discussions, such as de-briefing ST teaching.

2. Further insight into whether STR interviews may enable agentic ST learning would be a useful avenue of study. With poor retention rates in teaching linked to a lack of self-efficacy (Wilson and Deaney, 2010) what role could STR interviewing play in activating STs in their own learning, building self-efficacy in the process of learning to teach and maximising experienced colleagues as sources of teaching knowledge?

These suggestions would add to the body of knowledge which continue to inform ST learning and mentoring practices in ITE (Hagger and McIntyre, 2006; Burn, 2007; Crasborn *et al.*, 2011; Beauchamp *et al.*, 2015). Greater understanding of what TK is, and how it

can be usefully accessed within ITE programmes (including STR interviewing), would be auspicious and valuable in light of my findings and others' which include reports of STs being constantly told their teaching is not good enough, and feeling pressured to adopt a 'particular teaching persona' (Hobson *et al.*, 2006). Brown and McIntyre's (1995: 14) observation regarding the usefulness (yet inaccessibility) of experienced teachers' TK, where 'the wheels of teaching have to be reinvented by each new generation [because the] reservoir of professional knowledge is generally untapped', is still an issue for many STs and emphasises a pressing need for mentors' TK to be more valued and successfully explicated.

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8. Appendices

A. Glossary

DfE: Department for Education. The Department for Education is a government department responsible for education, children's services, higher and further education policy, apprenticeships and wider skills in England.

HE/HEI: Higher Education/Higher Education Institution. Higher education offers post-secondary education, or third level education, and is an optional final stage of formal learning that occurs after secondary education. Often delivered at universities, academies, colleges and institutes of technology.

ITE: Initial Teacher Education: Refers to pre-service teacher preparation.

ITT: Initial Teacher Training: Refers to pre-service teacher preparation.

Mentor: A school teacher who supports a ST whilst they are training to qualify as a teacher. A mentor is usually a subject specialist offering pedagogical and professional advice for STs in the school context.

Ofsted: Office for Standards in Education, Children's Services and Skills. Inspection and regulation service and a non-ministerial department of the UK government, reporting to Parliament via the Department for Education. Ofsted is responsible for inspecting a range of educational institutions. It also inspects childcare, adoption and fostering agencies and initial teacher training.

PCK: Pedagogical Content Knowledge. Knowledge owned and used by teachers in their professional work. PCK was identified by Shulman in 1986.

PGCE: Professional / Post Graduate Certificate in Education. A Post Graduate Certificate in Education is typically completed over one academic year and prepares students with a Bachelor degree to become qualified teachers at master's level. Some universities also offer a Professional Graduate Certificate in Education, which is honour's level equivalent.

SD: School Direct. This is a teacher training course which generally last a year, is predominantly based within two school settings and results in qualified teacher status (QTS) – some SD courses also award a PGCE at master's level.

ST: Student teacher (also referred to by other terms: trainee, novice teacher, beginning teacher, associate teacher, pre-service teacher).

TK: Tacit knowledge (also referred to by other terms: implicit knowledge, professional craft knowledge, intuitive knowledge, subconscious knowledge).

QTS: Qualified Teacher Status.

B. Focus group questions

Information sought and links to research questions (RQs)	Possible phrasing of questions - prompts
Seek to find out how STs view mentor knowledge. Does TK feature in their descriptions? RQ1	**What kinds of knowledge and understanding do you think school based mentors have that are useful for STs?**
What are the methods by which STs are learning from and working with their mentors? RQ2	**What are some of the most effective ways STs can learn from mentors?**
The role of TK in a mentor-ST relationship. Does TK have a priority amongst STs? RQ1	**In terms of learning on the PGCE what do you think STs want from a mentor?**
The role of TK in a mentor-ST relationship. Does TK have a priority amongst STs? RQ1	**In terms of learning on the PGCE what do you think STs do NOT want from a mentor?**
Establishing a shared understanding of the object of study	**Researcher INPUT on TACIT KNOWLEDGE**
ST understanding of TK and the role of TK in teacher education. RQ1	**Have you ever considered this type of knowledge when working in school?**
Attempt to establish current ideas or ways of working which may allow STs access to the TK of their mentors. RQ2 What are the influencing factors when	**What working practices might encourage interns to have access to tacit teaching knowledge?**

trying to access TK from a mentor? RQ3	
What are the influencing factors when trying to access TK from a mentor? RQ3	**Are there things which get in the way of STs accessing tacit teaching knowledge?**
Trying to establish the role and importance of TK as viewed by STs. RQ1	**Could you see tacit teaching knowledge being of use to STs in their PGCE year and beyond?**

C. Chronology of data collection

Research activity	Date
Ethical permission granted	10th February 2014
Ethical permission gained from research participants	w/b 10th Feb 2014
Focus group discussion	17th February 2014
Ethical permission gained from research participants	w/b 3rd March 2014
Initial study STR interview	12th March 2014
SurveyMonkey questionnaires sent out to mentors and STs	23rd January 2015
Ethical permission gained from research participants	w/b 23rd February 2015
Further STR interviews	1st-15th March 2015

D. Interview transcript example

Interview one

March 2014

Will (facilitator and ST) and Claire (interviewee and mentor)

Facilitator :	I notice that you have the objective written on the board. It's sort of the first thing that you do when the class come in. Why did you do that?
Interviewee:	First of all, Ofsted like to see the objectives on the board. It's so that if anyone comes in to the lesson they can see that the objectives have clearly been shared and you can monitor the progress of the children, within the lesson - how much progress they make within a lesson. So if they have an objective written on there you can - and it stays on for the whole lesson, you can easily come back on it to check whether they understand it or not.
Facilitator:	So the idea is that it stays there the whole lesson.
Interviewee:	Yep.
Facilitator:	Rather than it just being on the first slide and then it goes away.
Interviewee:	Yep so you always come back to it. The idea is that you come back and you say right, this is the objective, do you think you - how confident are you at this? It's there throughout the lesson.
Facilitator:	So you can use it for [AFL] and stuff?
Interviewee:	Yeah.

Facilitator: Great. So in the starter activity you did, they were having a class discussion and you were always saying - when they give an answer you were always saying why. Why did you keep asking why?

Interviewee: It's to check their understanding. Most pupils will be able to give you a basic answer. Either because they've heard it being said, or they've discussed beforehand from someone else, but they might not know the reason as to why they've given the answer. So by extending the question and asking why, that then gives you an indication of that the individual understands exactly what they are saying.

Facilitator: Great.

So moving on to the kind of main activity for the lesson. I noticed that your instructions were particularly clear and you took time to explain these instructions. I also noticed that you got pupils to recap, is that something that you do often? If so, why do you get students to recap when you've given them instructions?

Interviewee: Yes I do try to do it as often as possible.

The reason why I get them to recap is sometimes I may not have given an instruction clear enough for every single person in there to understand it and pupils are better at explaining in their own language what needs to be done.

So for that reason and secondly it makes sure that everyone is listening. I've told them once, possibly twice, then I've got someone else to tell them. They've had at least two possibly three explanations of the same task that they have to do. Making sure that they all understand.

Facilitator: Yeah just getting them to really understand it so that they're all on task.

So when you've given them instruction and they're all on task, I notice that all of the students, for the majority of the time were working really quietly and getting on with the task. When I teach them they often start talking and the volume just

keeps going higher and higher. Bit of a difficult question but I wonder how do you sort of maintain the quiet while they're on task and keep that low level of noise?

Interviewee: Usually if I want them to be quiet while they're doing individual tasks I tell them beforehand. So at the lesson I say - well before the task is actually set I say this is an individual task therefore you do not need to talk or I don't want you to talk.

That tends to - especially with the year sevens - work as almost like a nice threat at the beginning so they know where they stand and they know exactly what you expect of them. There's lots of tools which you can use as well.

There's traffic light tools, so that they can see on the board that the noise is getting too loud.

Facilitator: I remember you talking about that.

Interviewee: That's a good one, and that kind of works quite well. Also the minute they start talking or the noise starts to get high, it's just being on them straight away.

Facilitator: Okay, that's great.

When you're in another discussion, I guess this is a bit like always asking why when you're having a class discussion. I notice that you were using what if quite a lot. When the kids said an answer you'd sort of give them an alternative scenario where you said what if, what if this happened.

What was the idea of that, what was the thought process behind that?

Interviewee: It's higher order thinking skills, it allows the student to think beyond the situation that they are in. So if they've been given an aspect or a situation that they need to look at without prompting they will only look at that situation as it is. But if you change that and give them a what if for, the stadium wasn't near the river or something like that, it allows them to think a bit more outside the box and that's a higher order thinking.

Facilitator: Great so I guess kind of an extension.

Interviewee: Yeah.

Facilitator: A verbal kind of extension. That's cool.

So you're talking about stadiums and you spoke about them in general to start with, then you referred or - yeah you referred it to a local area so you started speaking about the relocation of Oxford United Stadium. Why did you decide to do that, why was that a good idea to [unclear]?

Interviewee: It's nice to kind of look at a broader aspect of it. Either going from a global or a general aspect to a local aspect works well because they've seen what it could be or what could happen. Then they bring it down into something that they know about, so the Oxford Stadium is something that they're all aware of and they all knew the area as to where the new stadium is - they didn't know the old area but they knew the new one.

So it makes it more relevant to them. Same as if you're doing it the opposite way, starting local and then expanding to national or global. It just increases the understanding a bit better of the topic that they're doing and since we were able to use the local example then we might as well use it.

Facilitator: Might as well use the local one that they know about rather than something far off.

Interviewee: Something that they don't know.

Facilitator: The next observation I made was just about the noise level again, and that when the noise did kind of get too high or higher than you expected, you then warned them. I noticed that that was quite successful. When you give them warnings about the noise level, how would you do that successfully? How do you get them to heed that warning?

Interviewee: Most don't like losing their break.

[Laughter]

Facilitator: That's an easy one.

Interviewee: So I've waited for a minute that means you're coming back for a minute in your break time. Or if I have to wait another minute you'll be coming back or something like that. They don't like the idea of losing their break so they will usually be quiet if you threaten the fact that they can't have lunch or something.

Facilitator: Eye for an eye, tooth for a tooth kind of thing.

Interviewee: Yep. [Laughs].

Facilitator: So I noticed that when you were giving those warnings you maybe change your voice or change how you were talking to them. So if you were just giving them a task you'd be speaking in one way, then maybe you'd change your…

Interviewee: You tend to go deeper. So if you're just talking in general I find I might have a bit of a softer voice or more of a projected voice if I wanted to give them instructions. Then if I'm not happy with the noise levels, the voice deepens a little bit, even though it's hard to note my voice deepening. But the tone changes and it becomes more assertive and slower. That's, obviously again it's like saying without actually having to say I'm not happy.

Facilitator: Just letting them know isn't it?

Interviewee: Yeah.

Facilitator: That your change in tone means that…

Interviewee: I suppose it's like dogs if you want, if you try to give instructions to dogs, different tones are understood. Same as children. [Laughs].

Facilitator: The final observation I made was at the end of the lesson when you gave them homework, I always find that I'm always rushing to give homework at the end of the lesson because I run out of time or whatever. I noticed when you did it you left

plenty of time for them to kind of get the instructions - you'd given clear instructions and you'd written it on the board, then you left plenty of time to write it in.

That was the observation, I just wondered how make sure that they all - because you can't go around to every student saying did you get the homework, have you got it written in? How do you generally know that they've got it written and they've understood what you actually want them to do?

Interviewee: So it's usually stuff to go with the planners, so you get them to take their planners out and you can do a quick scan of the classroom and see that they've all god their planners out and they're all writing in there.

Then give a chance of - does anyone need help writing them in? Especially Year 7, I wrote it in for one of my other students that I teach in a different class because he has trouble writing in the instructions because he has trouble writing. So, knowing that, when I give homework I say I'll write it in for you, and then do that.

It's knowing your students really, which ones are going to find it difficult and which ones are going to write it in no problem.

It is difficult because at the end you go along with the lesson and you sort of think it's all going fine, you don't really want to stop just to write in the homework so you might leave it a little bit and then you realise you're out of time.

Facilitator: Yeah that's what I always do.

Interviewee: There's nothing stopping - if you know what the homework is going to be, is doing it in the middle or beginning of the lesson. So if you think I want them to do a [unclear] on a stadium or something. You can say, right at the beginning of the lesson everyone get your planners out now, this is your homework and then you can continue with your lesson.

Facilitator: I guess sometimes at the end of the lesson they're all - they know it's the end of the lesson and they're just scribbling it down rather than - if you do it at the beginning then maybe you can get them to write down a little bit more, maybe take more time over it.

Interviewee: Yeah, or even if you decide half way through, you think I'm not going to get this bit done within the lesson, I'd like them to do it for homework then just do it half way through.

So if you know what the homework is going to be or you've got a feeling there's going to be homework at the end because they're not going to have enough time to do it in the lesson just stop at the middle or tell them to put it in at the beginning of the lesson. It gives you time then to make sure that they've all done it and all understood it rather than them wanting to go out for their break.

Facilitator: Yep, cool. Thanks very much.

Interviewee: Alright.

Facilitator: Great.

[Laughter]

END OF TRANSCRIPT

E. Questionnaire content

ST SurveyMonkey questionnaire on the use of tacit knowledge in learning to teach

Sent out January 2015

Q1. One definition of tacit knowledge is that it is *subconscious knowledge developed from experience.* How would you personally define the term 'tacit knowledge'?

Q2. Tacit knowledge can be useful to teachers because conscious deliberation over decisions and actions is not always possible in a fast paced classroom environment.

Q2a. Do you think you have used this type of knowledge on the PGCE already?

Q3. How useful do YOU think tacit knowledge is in the teaching process?

Q4. Do you think that gaining access to your mentor's tacit teaching knowledge could be useful for you in learning to teach whilst on the PGCE?

Q5. Please suggest ways of accessing your mentor's tacit teaching knowledge (i.e. that which you cannot explicitly observe)? All suggestions welcome.

Q6. Have you ever tried teaching suggestions without understanding WHY you are doing it?

Q7. What reveals the most to you in terms of WHY teachers act, respond, plan or teach in the way that they do?

Mentor SurveyMonkey questionnaire on the use of tacit knowledge in learning to teach

Sent out January 2015

Q1. One definition of tacit knowledge is that it is *subconscious knowledge based upon experience*. How would you personally define the term 'tacit knowledge'?

Q2. Tacit knowledge can be useful to teachers because conscious deliberation over decisions and actions is not always possible in a fast paced, dynamic classroom environment.

Q2a. Do you think you use this type of knowledge?

Q3. How useful do YOU think tacit knowledge is in the LEARNING TO TEACH process?

Q4. Do you think that it is possible for interns to access your own tacit teaching knowledge?

Q5. Can you suggest ways in which interns may be able to access the knowledge and judgements informing your teaching decisions?

F. Student teacher guidance for stimulated recall interview

Guidance for the interview was verbally discussed with participants and a short written summary of what was to be carried out in school was given out. The written summary was follows:

1. Observe your mentor teaching a lesson

2. Suggested: Keep a few notes of what is happening during the lesson – pupil activities and teacher activities/comments. Note any interesting/key points in the lesson

3. Think about what kinds of questions you would like to ask your mentor about the teaching

4. Ask your mentor questions to encourage him/her to reveal why he/she made particular decisions– perhaps about key episodes that happened. Audio record the discussion

G. Lesson Observation Sheet

Lesson Observation **Class:** **Date:**	**Lesson overview/ objectives in brief:**
Timings	**Key episodes/events to enquire about after the lesson.** **What is happening?** **What is being said?**
Possible Qs to ask afterwards:	

H. Ethical Approval

The Open University

Memorandum

From	Dr Duncan Banks Chair, The Open University Human Research Ethics Committee
Email	duncan.banks@open.ac.uk
Extension	59198
To	Nicola Warren-Lee, FELS
Subject	*"What factors enhance student teacher understanding of tacit knowledge when working with experienced teachers?"*
Ref	HREC/2014/1613/Warren-Lee/1
AMS ref	n/a
Submitted	3 February 2014
Date	10 February 2014

This memorandum is to confirm that the research protocol for the above-named research project, as submitted for ethics review, has been given a **favourable opinion** by the Open University Human Research Ethics Committee. Please note that the OU research ethics review procedures are fully compliant with the majority of grant awarding bodies and their Frameworks for Research Ethics.

Please make sure that any question(s) relating to your application and approval are sent to Research-REC-Review@open.ac.uk quoting the HREC reference number above. We will endeavour to respond as quickly as possible so that your research is not delayed in any way.

At the conclusion of your project, by the date that you stated in your application, the Committee would like to receive a summary report on the progress of this project, any ethical issues that have arisen and how they have been dealt with.

Regards,

Dr Duncan Banks
Chair OU HREC

I. Participant Information Sheet

Title of the study: Tacit knowledge and learning to teach.

Researcher: Nicola Warren-Lee. Contactable at the Department of Education, Oxford University, 15 Norham Gardens, Oxford. OX2 6PY.

1. The purpose and value of the study: This study seeks to make small scale initial enquiries into how beginning teachers are developing their own teaching expertise through accessing the tacit teaching knowledge of experienced teachers. This is a valuable study raising awareness of how to access experienced teachers knowledge and understanding of teaching. It is useful for the professional development of all participants involved on a PGCE course including; mentor, intern and tutor.

2. Participants are being asked to take part in this study as they are placed within Partnership schools which the researcher has a relationship and regular contact with.

3. Participating in this study will require time for;

o an initial focus group meeting of up to 30 minutes.

o a 15 minute discussion with the researcher regarding a school-based observation.

o The intern will be asked to observe his/her mentor teaching in one lesson in school. Following the lesson the intern and mentor will discuss the teaching. This observation and post lesson discussion is part of ongoing professional studies in school and is not an extra request or time commitment. The researcher will not be observing any participants as part of this study.

o a 10-15 minute conversation regarding the observation and post lesson discussion process

4. Participants are encouraged to ask questions prior to agreeing to participate in this research.

5. Participants will all be over 18 years of age and can choose whether they participate. If they agree, they may withdraw from the study without penalty at any time by advising the researchers of this decision (if the potential participants are students there should be particular reassurance that there is no academic penalty for non participation or withdrawal)

6. This project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee.

7. Data.

How will the data be stored and in what format?

The participants will audio record the discussions. The audio files will be kept electronically. They will be transcribed and stored as Word files. Electronic files will be stored on a personal computer and encrypted USB. Storage locations will be the researcher's personal address and the Department for Education buildings in Norham Gardens.

Hard copies of research notes, where produced, will be stored at the researcher's address or in locked office at the Dept. Of Education in Norham Gardens and will be confidentially shredded after the study has been used as part of an EdD thesis in April 2016.

For how long will the data be kept?

The date for the end of the EdD, of which this study is a part, is currently expected to be April 2016. After this date the audio files and notes will be deleted or confidentially shredded.

Who will have access to the data?

The researcher and the participants will have access to the raw data until April 2016. Data may be used as part of an EdD and the final anonymised thesis will be available to Open University staff and students for an unlimited period.

The data will be anonymised and no schools or participants will be named in the writing up of any findings. Comments regarding pupils will be anonymised. The findings from this study may be used in a doctoral thesis as part of study with the Open University.

8. As this initial study is part of an EdD the data from this research may be used within a doctoral thesis submitted to the Open University.

The Open University is committed to the dissemination of its research for the benefit of society and the economy and, in support of this commitment, has established an online archive of research materials through library services. This archive includes digital copies of student theses successfully submitted as part of an EdD programme; these can be made available to registered OU students on request.

If you agree to participate in this project, the research will be written up as a thesis. On successful submission of the thesis, it will deposited both in print and online in the Open University archives, to facilitate its use in future research. The thesis will be published with restricted access to those who are registered with the Open University and request a digital or hard copy.

9. The benefits of taking part in this research are intended to be;

o an increased opportunity to discuss learning to teach.

o the benefits of focussed observation of experienced teachers in a relevant curriculum area

o opportunity to discuss reasons behind teaching actions and decisions

o improving understanding of how observation and discussion can move beginning teachers on in their development as teachers

10. Risks involved:

o Time pressures are always a concern whilst on a PGCE course. This study may add to intern and mentor workload. Please see point number 3 above.

11. The procedure for raising concerns and making a complaint

If you have a concern about any aspect of this project, please speak to the relevant researcher (07970803012) who will do her best to answer your query. The researcher should acknowledge your concern within 10 working days and give you an indication of how she intends to deal with it. If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the University of Oxford (Chair, Social Sciences & Humanities Inter-Divisional Research Ethics Committee; Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD). The chair will seek to resolve the matter in a reasonably expeditious manner.

J. Letter to Participating Schools

UNIVERSITY OF OXFORD

DEPARTMENT OF EDUCATION

15 Norham Gardens, Oxford OX2 6PY

Tel: +44(0)1865 274024 Fax: +44(0)1865 274027

nicola.warren-lee@education.ox.ac.uk

What factors enhance student teacher understanding of tacit knowledge when working with experienced teachers?

Information for Head Teachers

Dear

My name is Nicola Warren-Lee and I am a researcher affiliated with The Open University and the University of Oxford carrying out research with geography student teachers and their mentors. The project is being supervised by Dr. Maggie Smith of The Open University. From this research insight will be gained into what and how student teachers learn about their mentor's teaching knowledge, with the aim of enhancing professional knowledge and practice in the area for myself, the participants and wider ITE community.

If you are happy for your school to participate in the study I hope to ask student teachers and mentors to take part in a lesson observation and de-briefing (interview) procedure. The interview with the participants would last for approximately 30 minutes following a lesson in which the mentor teaches and the student teacher observes. No pupils are being asked to be part of this research.

Information collected from all participants will be kept confidential and stored securely. Only myself and the project supervisor will have access to the data and, in accordance with the requirements of some scientific journals and organisations, the coded data may be shared with other competent researchers. All

participants' names will be anonymised. If there is a withdrawal of consent before the point of data collation, the data will be destroyed. No information leading to the identification of your school will be included in any publication or distribution of the results. Your school's involvement is voluntary and you may withdraw permission at any time during the project.

I would be very happy to speak further with you to explain more about this project if you would like to suggest a suitable date and time.

Please contact me using the e mail or telephone details above.

Yours sincerely

Nicola Warren-Lee

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